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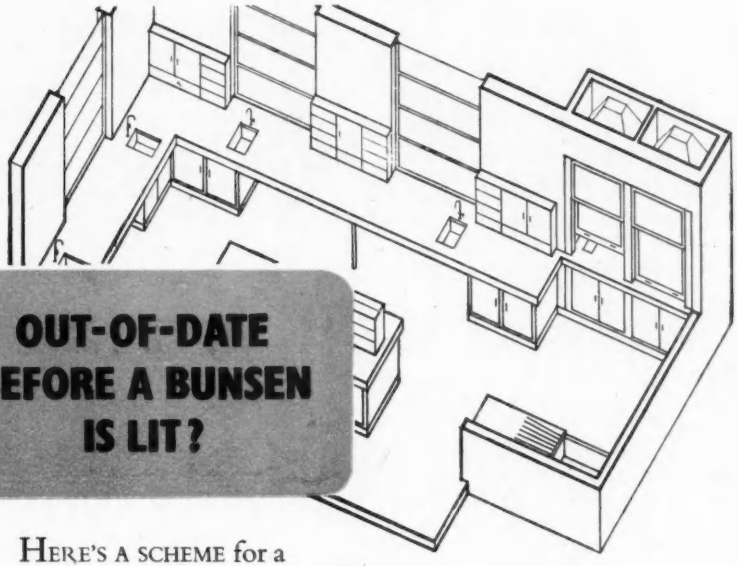

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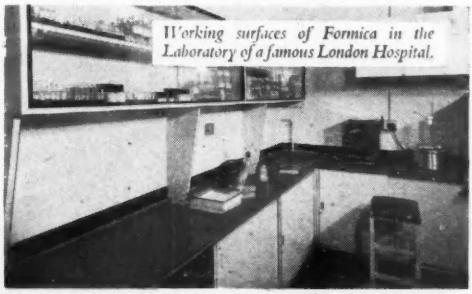

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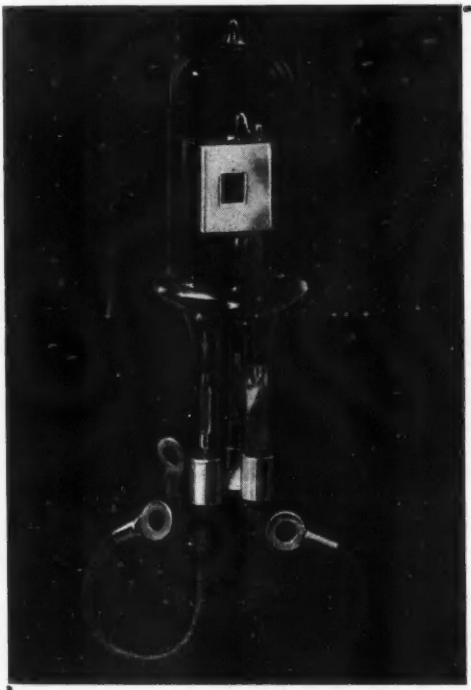

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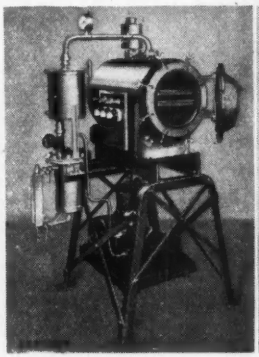

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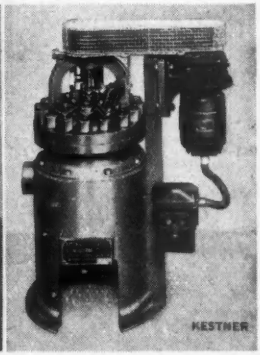

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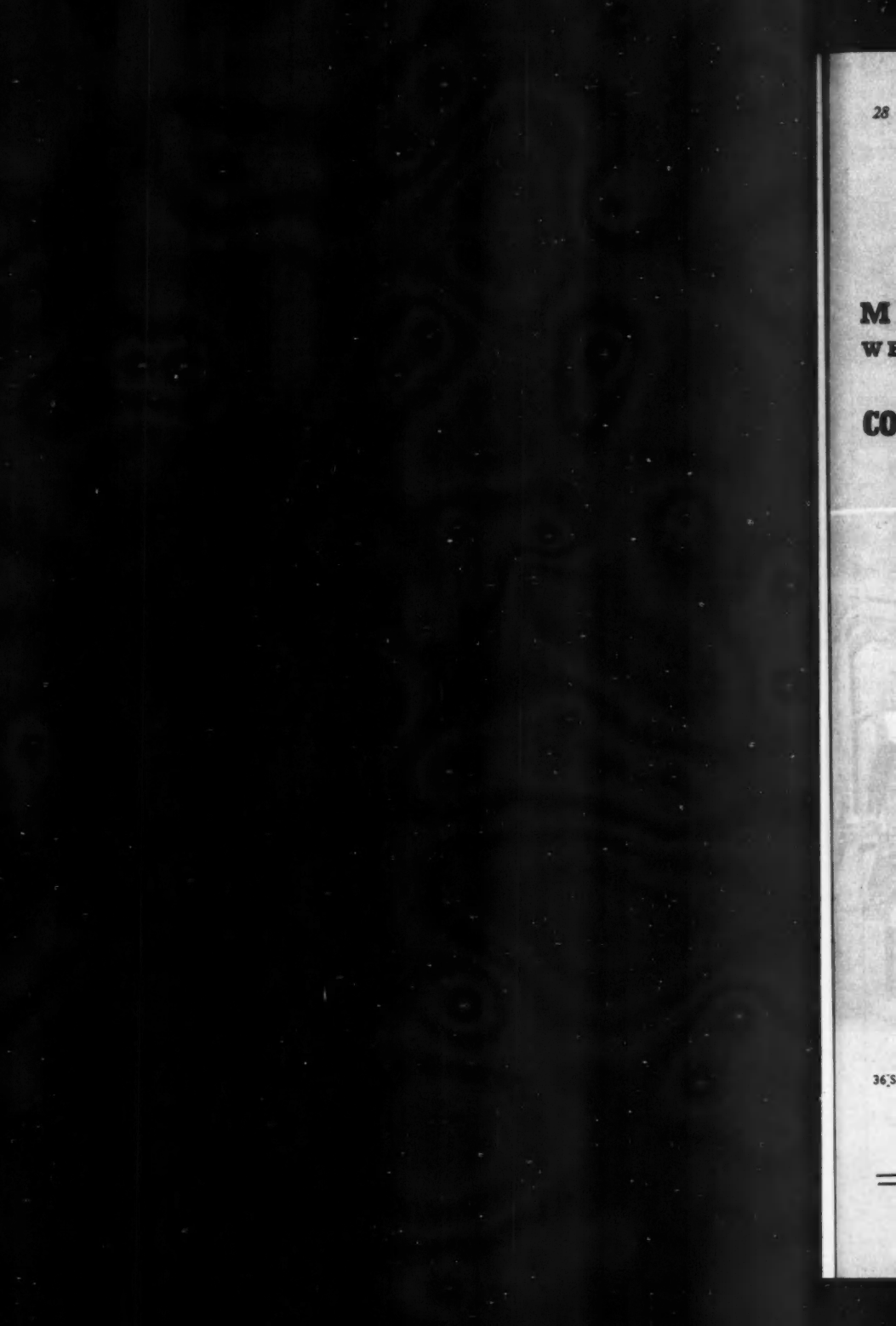

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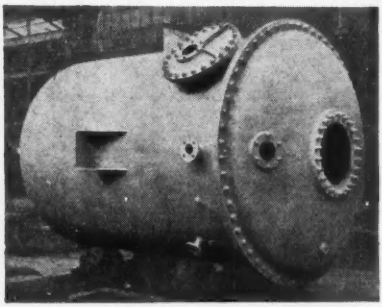

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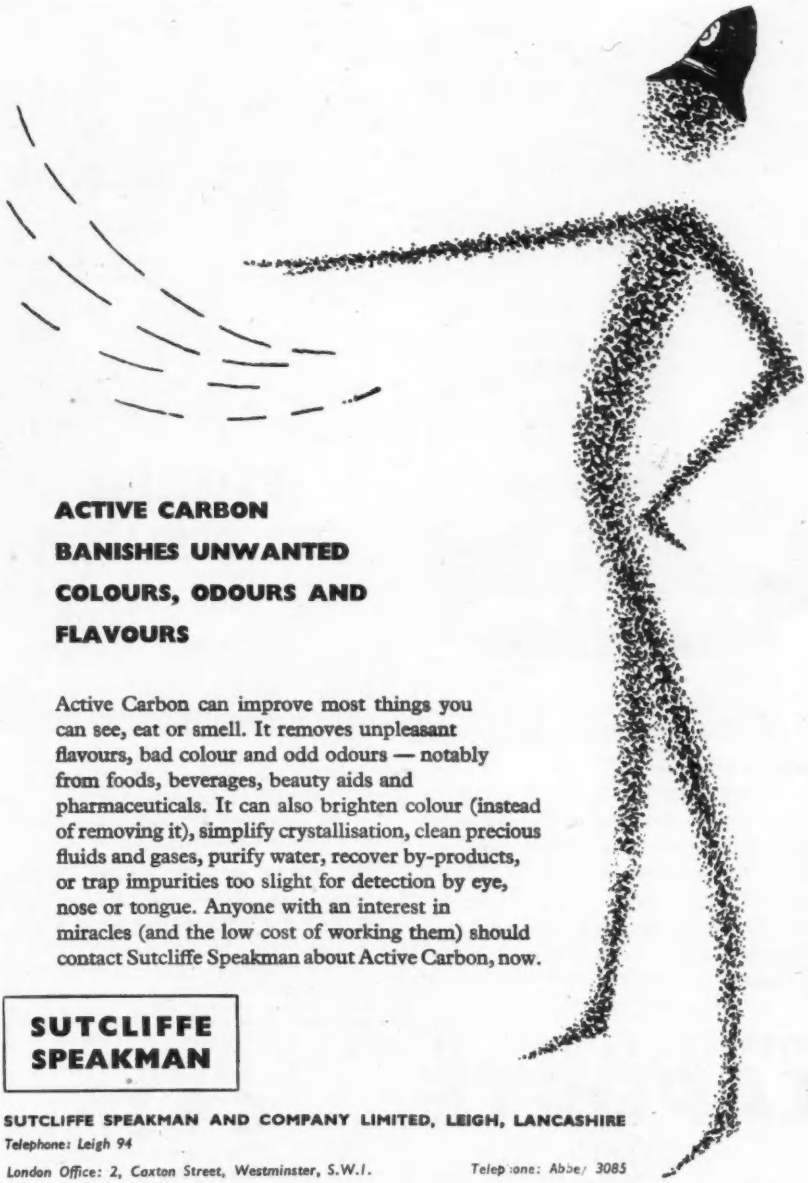

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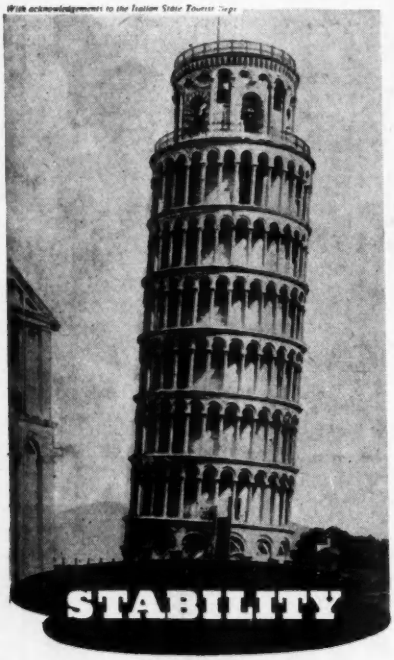

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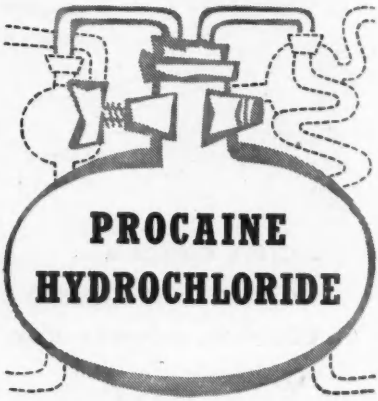

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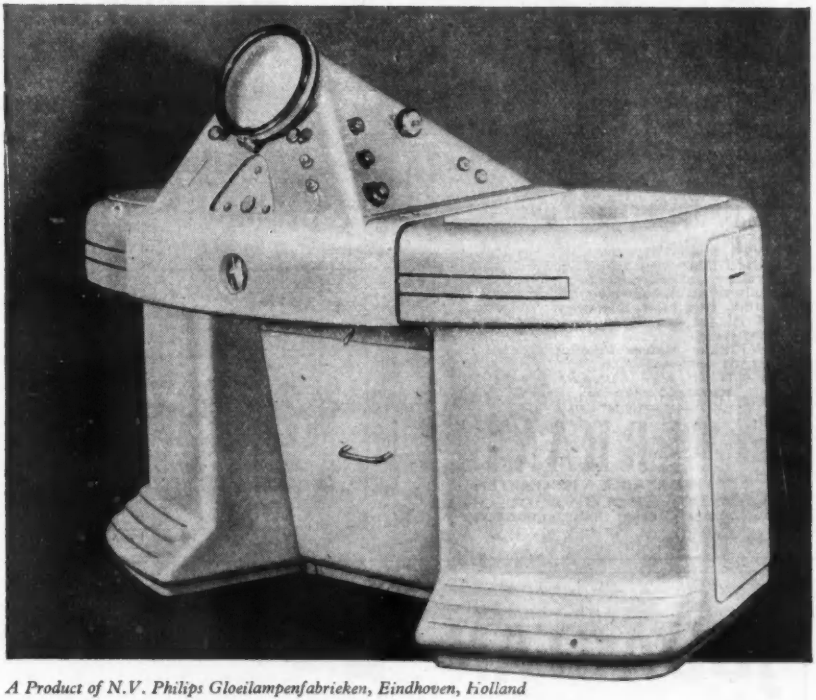

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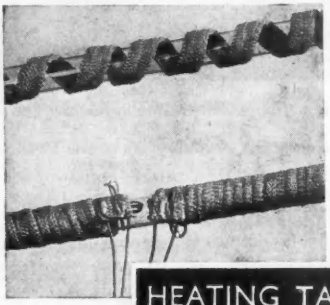

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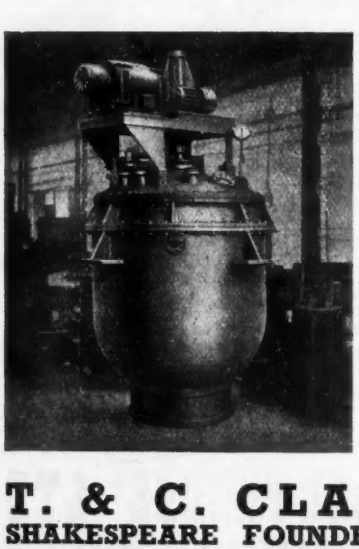

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Volume LXVI 28 June 1952 Number 1720

Politics & Science

MOST modern historians have tried to keep their own prejudices and political leanings under thermostatic control. Today the good historian does not deliberately 'take sides.' When we come to the history of science and scientists we might well expect the highest possible standard of impartiality. Science brings its own disciplines. Mr. J. G. Crowther's new book, 'British Scientists of the Twentieth Century' (1952, Routledge and Kegan Paul, London, 320 pp., 25s.), comes, therefore, with something of a shock. Mr. Crowther, no mean scientist or writer, seems to regard it as his duty and mission to interpret the work and lives of great scientists in terms of the political issues that now sadly and wastefully divide the world.

'One of the aims of this book,' he writes in his introduction, 'is to look at the life and work of great British scientists of the immediate past from the perspective engendered by the new British situation.' (This new situation is the decline of British pre-eminence in the world.) A little later in the same introduction, he writes. 'It is concluded that they were deeply influenced by various phases of British capitalist development and imperialism.' This conclusion of Mr. Crowther's is hardly surprising, for he has set out with this and no other purpose, and it has not apparently occurred to him that his judgment has the same validity as that of a man wearing red spectacles who states that Nature's dominant colour is pink and not green. In his account of the life and work of Sir Frederick Gowland Hopkins, Crowther quotes the view of an American pupil that Hopkins' experiments were merely practical work to confirm conclusions at which he had already arrived in his intellectual imagination. 'The criticism,' says Crowther, 'was not without point.' To carry out properly controlled experiments in the hope that they will confirm a theoretical supposition is sound scientific practice; to write or re-write history in the hope that the historian's personal and contemporary outlook will be confirmed is self-deception.

The pity and the danger is that this book is so substantial and the biographies of the six selected scientists—J. J. Thomson, Rutherford, Jeans, Eddington, Hopkins, and Bateson—are excellently handled insofar as the author has been content to present factual details of their careers. With science scarcely keeping pace with its own progress, fewer and fewer books on the history of science—certainly on its recent history—are produced. Should readers who will turn to this impressive

book for information be also served with so much political embellishment?

'The six scientists discussed were all Cambridge men, and five of them belonged to Trinity College. This indicates a considerable degree of uniformity in the cultural environment of the leadership of British science, which, from the aspect of world-civilisation, has necessarily a certain narrowing tendency.' The author himself selected the six men of whom he writes; and perhaps with convenience since he himself is also a Cambridge and Trinity College product. He could have made nonsense of his own deduction of uniformity in environment had he selected additionally or alternatively such men as Ramsay, Armstrong, Daniel Hall, or even one of the individual pioneers like Baird. 'Bateson was a scientist of great ability, who was unable to overcome the obstructions of the ideology of the society in which he lived . . . His life and work provide a vivid illustration of the frustration of a great scientific talent by a declining imperialist social system.' But in the very section devoted to Bateson we are given a laudatory account of Lysenko's contemporary work in Soviet genetics; the ideological atmosphere that has condemned Russian scientists who cannot accept Lysenko's views is not apparently a form of frustration! Rutherford 'appears indeed as a mighty scientist, but an unconsciously tragic social figure. His discoveries were exploited, after the end of his optimistic life, by decadent social forces for anti-human purposes.' Of Hopkins we are told that 'he had no taste for public affairs' but he nevertheless 'became one of the chief statesmen of science of his generation. This was due to several causes. The first of these was his interest in socialism.' It is clear enough that Hopkins' unusual path towards high position at Cambridge, from a start as a clerk and through the taking of an external London degree, is likely to have induced a sensitivity to social injustice and some distaste for the patronising attitude of those who qualify more easily. But these are mere sidelights in the life and work of a man who opened up modern biochemistry and played a leading part in the discovery of vitamins. Let it be said—for those who like entangling science and politics—that a non-socialist society gave Hopkins the opportunity to achieve his life-work and the funds that helped came first from the Beit Fellowship Trust and later from the estate of a capitalist hat-maker.

Pure science is non-political. Only a fool would say that the application of science is also and always free from political influence, or at any rate from state policy considerations. To concede this does not mean, however, that the history of science should be written with an ideological pen dipped in party-political ink. Nor should the students who are tomorrow's scientists be persuaded to look back upon great men of the past as political warnings, examples of frustration or exploitation. What his publishers call Mr. Crowther's 'new way of treating the biography of scientists' may be sincere but it is none the less regrettable and dangerous for all that.

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Notes & Comments

Krilium, et al.

AT the end of 1951 there was one chemical soil conditioner—Krilium. Before the middle of 1952 Acri-Soil, Aerotil, Agrilon, Fluffium, Terra Kem, Poly Ack, and SoiLife—all chemical soil conditioners—had appeared on the American market. To many people this might seem yet another example of the speed with which scientific discovery can be put into application by U.S. industry; to agriculturists, however, it is pathetically regrettable. The new products are mainly aimed at the gardener's market; and an independent check of retailers selling the new conditioners has already revealed that not one retailer genuinely understood what a chemical soil conditioner could do—and, more important still, what it could not do. Commercial exploitation has jumped ahead of research and development not merely by months but by years. It is no doubt for this reason that the producers of Krilium have felt obliged to accelerate their own plans and are already marketing a gardening product under the name 'Merloam.' Nevertheless, the original plans, involving only experimental usage this year and withholding commercial distribution until 1953, were surely wiser and more appropriate.

Rush Deplorable

SOILS already in good condition cannot benefit from poly-electrolyte conditioners; chemicals these substances may be but they are not fertilisers. Moreover, the cultural problems of difficult soils are widely varied and much more research is obviously called for before it can be claimed that a soil-binding polymer is the universal panacea. Indeed, such a claim is so unlikely that it can be ruled out before research investigations on many kinds of soils have been conducted. The commercial rush to produce and sell chemical soil conditioners must be deplored, particularly since the consumer aimed at is the small user, the private gardener, the buyer least likely to possess technical knowledge.

Caution Best Policy

IT is clear that there can be no monopoly in the soil conditioner market. A range of polymeric molecules can function as soil particle binders. It seems imperative that in this country a similar rush to produce and market soil conditioners should be prevented. Commercial developments must keep pace with properly conducted soil research. In the average British garden plant-food deficiencies far more than humus deficiencies limit food production. The use of soil conditioners, induced as it could be by pressure-advertising, would tend to reduce existing expenditure upon fertilisers yet without in many cases bringing increases in soil productivity. It is to be hoped that the Ministry of Agriculture will adopt a firm and cautious policy towards this new idea. In the long run chemical soil conditioners will find a stable and respected market if their initial development is not rushed. An early record of widespread misuse and unsuitable application can bring nothing but discredit. It is regrettable that Monsanto, the producers of Krilium, have been forced to rush into commercial production by firms who have not the same high principles.

Research Costs

STATISTICS are collected in the modern world as avidly as postage stamps and cigarette cards, so it is hardly surprising that the research-minded Americans have tried to assess research costs by a kind of Gallup Poll statistical survey. One hundred and forty-nine research organisations were questioned by the U.S. Defence Department's Research and Development Board. Forty-two of these were industrial firms, 56 state establishments, and 51 universities or other private and non-commercial research centres. It is stated that some 30 per cent of the United

States' research personnel was in fact employed in these 'polled' organisations. In industry the average annual cost per research worker (a term that includes the technicians, administrative and clerical workers) is now $8,500; and the cost per qualified worker (e.g., scientist or engineer) is $20,100 per annum. In state establishments the two figures are respectively $5,500 and $22,800. In the universities and non-commercial private centres, however, costs are much lower, the annual figure per scientist or engineer being only $8,900, much less than half the comparable cost in industrial or government research. There is, of course, an obvious reason for this—many of the workers are unpaid, engaged in post-graduate investigations for experience and for obtaining higher degrees, etc. The higher cost per qualified scientist in government research at first sight seems a criticism of state spending and a tribute to the efficiency of private enterprise, but superficial judgment is misleading. In the state-run centres only 25 per cent of the total number of workers can be classified as fully qualified scientists or engineers; in industrial research the percentage is 40. Even so, it would appear that government institutions carry larger 'overheads' than industry. Attempts of this rough kind to obtain costs must be cautiously interpreted and only very large differences between one form of research and another should be looked upon as significant. Nevertheless, similar investigations in this country might well produce interesting results. Much is said, and rightly so, on the need to expand our research and development activities, but actual estimates of costs are seldom discussed.

Chemical Prospects

OUTLOOK for the future of the British chemical industry has been reviewed recently in statements by chairmen both of the large-scale organisations and the smaller firms, and while the assessment shows the need for a vigilant watch on changing conditions, there seems to be no cause to doubt the ability of the industry to overcome any temporary difficulties. The change in recent months has been from a seller's to a buyer's market. While Imperial Chemical Industries, Ltd., with so many varying fields of activity is almost inevitably affected by the adversities of other business concerns, so also its widespread interests enable it to gain on the swings what it may lose on the roundabouts. The slackening-off of forward demand during the first three months of this year reported by the chairman of Laporte Chemicals, Ltd., is an indication that many countries and trades now feel that they have sufficient stocks and are hesitant to buy. Another factor influencing the future outlook is the increasing competition from Czechoslovakia, Germany, Italy, and Japan, naturally eager to try and regain part, or all, of the export markets to which they sold before the war. One of the biggest considerations, however, must be the recession in other industries. Any fall in the production of the textile, rayon, rubber, leather and plastic industries is bound to have its repercussions on chemicals. While this is illustrated by a decline in the demand for dyestuffs, it has also undoubtedly helped to overcome the shortage of sulphuric acid.

Projects Postponed

BOTH I.C.I. and Laporte reports showed that there is no lack of major projects planned, but these must be held back either for lack of permission to embark on new schemes, or because of the shortage of essential equipment and building materials for which rearmament is, rightly at present, claiming priority. Nevertheless, as the chairman of I.C.I. pointed out, exports are nearly as important as rearmament, and it is therefore in the interests of the country as well as the industry that any hindrance to capital programmes should be relieved as soon as conditions permit. A final problem about which most industrial leaders have been unanimous in their condemnation since its introduction is the Excess Profits Levy. This unwise piece of legislation, which is proving an unfair handicap to many firms, would seem, as pointed out by Mr. John Rogers, chairman of I.C.I., to have been designed to encourage stagnation and prevent progress.

Fulmer Hall—Development Centre

IN the chemical industry a firm's progress can be judged by the amount and quality of the research it carries out and it was with just pride that the Developments Division of Monsanto Chemicals Ltd., entertained their many friends at Fulmer Hall, Fulmer, Bucks, from 17-20 June. Although some work has yet to be done in equipping the laboratories visitors saw more than enough to satisfy them regarding the future of the firm.

During the early days of Monsanto's existence, when pharmaceuticals and fine chemicals were the principal products, emphasis in research centred entirely around quality, and the greater proportion of the then modest research programme was devoted to the improvement of manufacturing processes. As the firm expanded to include the production of rubber chemicals and plasticisers for the paint and plastics industries, new lines of investigation were opened up. The technical problems of customers were tackled and the firm began to prepare chemicals which would perform specific tasks for which no standard product previously existed. For this purpose service laboratories were created for the rubber and plastics industries and a wide range of practical problems were studied.

Delayed by War

As the demand for industrial chemicals grew Monsanto expanded greatly and in 1938 plans were under consideration for a large-scale increase in manufacturing facilities and commensurate expansion in research, development and technical service. Owing to the war it was not possible to put these plans into operation until 1946. Since then a new factory has been completed at Newport in Monmouthshire and a great expansion of research and development activities has taken place.

Within the Monsanto organisation development is considered equal in importance to production and sales. Research is visualised in its broadest concept and there is a very close linking with productive effort. Research facilities are designed to 'give the creativeness and ingenuity of the scientist full scope, and to provide at the same time, an environment which will facilitate the valuation and exploitation of ideas of industrial value.' The practical results of these views are clearly shown at Fulmer Hall.

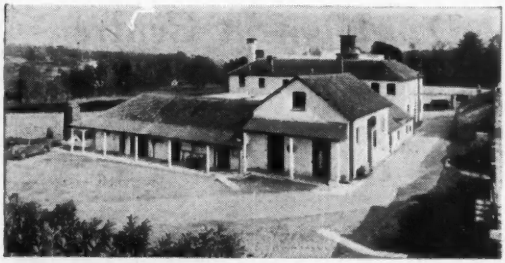
Complex Organisation

Monsanto's research and development organisation is rather complex. Under General Manager of Development, Dr. J. W. Barrett, there are five sub-divisions. These are, or will be, located at three centres—Ruabon, Newport and Fulmer Hall.

At the Nickell Laboratories at Ruabon are located the Exploratory Research Department and the Process Research Department, which includes the Pilot Plant Section and the Ruabon and Newport Products Sections. The latter will eventually be wholly transferred to the Newport factory.

The function of exploratory research is directed towards broadening the Company's activities and widening its range of products. Process research is responsible for developing new or improved processes for new or existing products in sufficient detail to permit engineering design to be undertaken. The pilot-plant section gathers all the data needed for full-scale design and manufacture and undertakes small-scale manufacture of new products.

Fulmer Hall, which is near Slough, in



The outbuildings which have been converted to provide the new laboratories at Fulmer Hall

Bucks, was acquired by the Company at the end of 1949 and conversion work was completed early this year. At present almost all the activities destined to be housed there have been transferred from Ruabon. It is under the supervision of Dr. J. A. Gardner, Manager, Central Development Department, and it is here that applicational research, technical service work, project development and all work connected with patents is carried out.

Project evaluation is responsible for initiating and evaluating ideas for research and for Company development arising not only from the Development Division but from external sources. The section is composed of chemists and chemical engineers with combined production, sales and research experience. This work involves a thorough search of all the published literature, and in collaboration with other divisions and departments, it is responsible for estimating capital requirements and production costs and obtaining market survey data.

The laboratories and testing facilities at Fulmer are for the use of the Applicational Research Section. This is concerned with the provision of technical service to customers (in co-operation with the Sales Division), with maintaining and extending the use of existing products and with the investigation and evaluation of new products arising from exploratory and process research activities. This work often involves close and confidential co-operation with consumers and the study of fundamental and practical aspects of many industrial processes.

At present the Section is divided into six clearly defined functional groups and one heterogeneous group. The functional groups are those dealing with petroleum chemicals, plastics, rubber chemicals, adhesives and surface coatings, agricultural chemicals and detergents and textile chemicals. The remaining group covers investigational work into silicones, fungicides, germicides, preservatives and general chemicals, any one of which may eventually become a separate group activity.

Fulmer Hall is approximately 200 years old but was reconstructed and modernised in 1920. In the Italian style it is a most delightful country house and is approached through winding drives terminating in a broad gravelled forecourt. The lawns, gardens, trees and shrubbery are most

A corner of the detergents laboratory where 'soiling' tests are carried out

attractive. A condition of usage was that the amenities of the house, outbuildings and gardens should not suffer from any conversion and this condition has been rigidly adhered to. As a matter of fact, a spokesman for the municipality last week stated that they were pleasantly surprised to find that Monsanto had actually improved the beauty of the property.

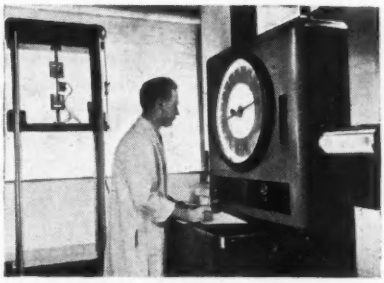
To avoid large-scale reconstruction the laboratories have, for the most part, been confined to the outbuildings. The main courtyard was roofed over to provide one large laboratory surrounded by communicating corridors and small laboratories and offices. The large laboratory will be used for technological work on rubber and polymers, while the small laboratories are mainly employed on the work of the oil additives, surface coatings and adhesives groups.

The clock tower building houses laboratories for adhesives and textile chemicals, microbiological, general chemical and physical investigation. The coach house has been converted to a constant temperature room for the physical testing of rubber, polymers, textiles, etc. The stable block contains laboratories, workshops and test cells for the oil additives group.

Visitors to Fulmer Hall last week were greatly interested in the work being carried out on Krilium, Monsanto's new soil conditioner. Studies of the effect of Krilium on the main soil types found in Britain were being undertaken in one of the laboratories and a number of experiments were under way in the greenhouses and gardens to test germination, rate of growth and crop yield of seeds and plants in Krilium treated soil. The laboratory work consist of the mechanical analysis of soils and estimations of the stability of soil crumb structures. It was explained to visitors that the bulk of the work to be done on Krilium in this country will be done in government and other independent research centres.

Varied Investigations

In the agricultural chemicals section, greenhouse and field-plot work was also being carried out on the applications of pentachlorophenol preparations and 2:4-D as herbicides. In the Petroleum Chemicals section engine tests were being carried out to test the efficiency of the firm's oil additives. After completion of each test, pistons, rings, bearings and small end bushes are subjected to careful examination.



Precision testing of plastics at Fulmer Hall

Equipment already installed in the main plastics laboratory and workshop includes a mixing and sheeting mill and a one-ounce injection moulding machine. A commercial nine-inch machine is in the process of being installed. Other equipment includes a Baldwin-Emery-Tate Testing Machine designed for the precision testing of plastics and other materials with low test loads. This is said to be the only machine of its kind in the U.K. and there is only one other model in Europe.

In the detergents laboratory 'soiling' tests were being carried out. White cloth is mechanically soiled with carbon black suspended in carbon tetrachloride or oil and then baked to fix the 'soil.' The test pieces are washed in electric washing machines, dried and ironed. Each piece is then tested for light reflectance with a photo-electric recording device. A curve of detergent concentration against reflectance determines the most efficient means of employing the detergent in any given set of circumstances.

In the textile chemicals laboratory workers were blithely snagging nylon stockings to test the efficiency of Syton (a colloidal suspension of silica in water) as an anti-snag agent.

Locusts Off the Menu

The emergence of chemical insecticides to fight the serious locust epidemics in the Middle East has put paid to what might have been a gourmet's paradise. Locust's legs are a prime delicacy throughout this area, but health officials in Basra, Iraq, have warned against eating locusts offered for sale, either dead or alive, in the city's bazaars. The chemical residues are harmful.

School of Pharmacy

A Century of Progress and Achievement

A NOTABLE stage in the teaching of chemistry and pharmacy in Great Britain over the past 110 years was marked by the Royal Charter of Incorporation recently granted to the School of Pharmacy, University of London.

The Pharmaceutical Society of Great Britain was founded in 1841, and two years later it was incorporated by royal charter 'for the purpose of advancing chemistry and pharmacy and promoting a uniform system of education of those who shall practise the same.' The success of this aim is borne out by the school, which began to function in Bloomsbury Square in 1842.

First Task

One of its first tasks was the setting up of suitable laboratories, and the school obtained an early distinction when it opened the first practical chemistry laboratory in Britain in which the subject was taught publicly. In 1888 a research laboratory was established for furthering pharmaceutical research, and, as the field of pharmacy widened, other laboratories were equipped to pioneer developments in pharmaceutical chemistry, bacteriology and pharmacology.

By this time the school had acquired an international reputation. Other achievements to the credit of the school were the pioneering of the biological standardisation of drugs, and its work in connection with the British Pharmacopœia. The compilation of the pharmacopœia indeed owes much to the school. In the early days Professors Redwood, Attfield and Greenish were editors, and when the Pharmacopœia Commission was formed, Professors Berry and Linnell were appointed to it.

In 1926 a new stage was reached when the University of London recognised the institution as a constituent school of the University, established a B.Pharm. degree, a Board of Studies in Pharmacy, and a place for the subject within the Faculty of Medicine. At the same time it conferred professorial titles on the staff.

An independent existence was given the school in 1948, and from that time onward its finances were provided by University grant. Its new council is widely representative of pharmacy and consists of the Dean and teachers, nominees of the University of London and the Pharmaceutical Society, together with co-opted members from industry and research. Medicine is represented by Sir Archibald Gray, Sir Henry Dale and Dr. Charles Harris. Chairman of the council is Sir Harry Jephcott.

Since the school became established in Bloomsbury Square, it has moved only once—during the second world war when it was evacuated to Cardiff. A second move is, however, envisaged when, in the near future, it will occupy an imposing new block in Brunswick Square, the foundations of which were laid in 1935.

Dean of the school is Professor H. Berry, B.Sc., F.R.I.C., who is professor of pharmaceutics in the University of London. Before coming to London, Professor Berry was head of the Department of Pharmacy of the College of Technology, Birmingham.

Glass Experts Meet

LEADING glass technologists from all the Western European countries, the U.S.A., and Japan, will meet in Britain for the eighth meeting of the International Commission on Glass which begins on Monday next, 30 June, and will be held in London and Sheffield.

Delegates will be entertained on the opening evening by the Glass Manufacturers' Federation at Hampton Court where they will be able to make a tour of the gardens at Hampton Court Palace.

The Commission was founded in September, 1933, inspired by the Society of Glass Technology, Sheffield. Its objects are to promote co-operative effort between members, to act as a clearing house for international, technical and scientific work and to transmit to the constituent societies scientific problems of international importance. It also endeavours to give assistance to those countries in which no society for dealing with glass technology at present exists.

Two previous meetings (in 1934 and 1948), have been held in Britain, and others in Italy, Germany, Belgium, Switzerland, and France.

President of the Commission is Professor W. E. S. Turner, F.R.S., founder of the Society of Glass Technology, Sheffield, whose influence and work on behalf of the glass industry is acknowledged throughout the world.

New Antwerp Refinery Opened

Petrofina-Anglo-Iranian Achievement

THE new 2,000,000-ton refinery at Antwerp, built jointly by the 'Compagnie Financière Belge des Pétroles S.A.' (Petrofina) and the Anglo-Iranian Oil Company, was officially opened at noon on 23 June by M. Jean Van Houtte (Prime Minister of Belgium), in the presence of several members of the Belgian government, leading industrial and political personalities, Sir Christopher Warner (British Ambassador) and Sir William Fraser (chairman of the Anglo-Iranian Oil Company).

The refinery was declared open when M. Van Houtte performed a 'geste symbolique' and said a few words of welcome from a rostrum specially erected for the occasion in front of the distillation unit. The ceremony was followed by a luncheon, to which 500 invitations had been sent out, and by a visit to the various establishments of the refinery.

The idea of building the refinery took shape in 1948 and its realisation began in 1949. The 'Société Industrielle Belge des Pétroles' was formed by the two parent companies, on a basis of equal shares, to carry out the project. Situated on the right bank of the Escaut, south of the Kruisschans lock, it is by far the most important refinery in Belgium.

Originally, its annual capacity was to have been not more than 1,400,000 tons, but, after the events in Iran which seriously threatened Western Europe's supplies of petroleum products, it was decided last year to increase this to about 2 million tons.

It is estimated that the refinery, covering an area of over 370 acres, conceded by the city of Antwerp, has cost about £10,000,000. It was found necessary to raise the level of the ground by 15 ft. so as to bring it above that of the Escaut at high tide, and, in order to do this, 5,000,000 cu. yards of hydraulic fill had to be brought to the site. 25,000 cu. yards of concrete and 25,000 tons of steel were used in the con-

Mr. J. Meeus (left) the general manager, with Mr. J. Moffat, the technical manager

struction and 350 miles of steel tubing of various sizes wind through the refinery in all directions.

The technical and administrative services are housed in buildings occupying 17,000 sq. yards and 5,000,000 working hours were spent in the construction of the refinery.

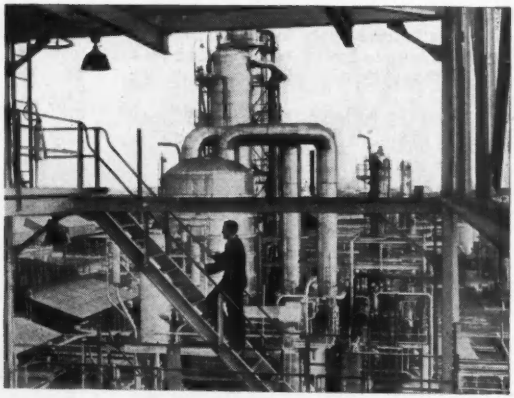
Supplies of crude oil come from the Middle East to be processed into the many products required by modern industry, including butane, motor spirit, fuel for jet aircraft, kerosine, gas oil, diesel oil and fuel oil.

The technical and other staff of the refinery is Belgian, but the Anglo-Iranian Oil Company have been able to make a contribution to the successful commencement of operations by making available to the refinery a number of their technical specialists.

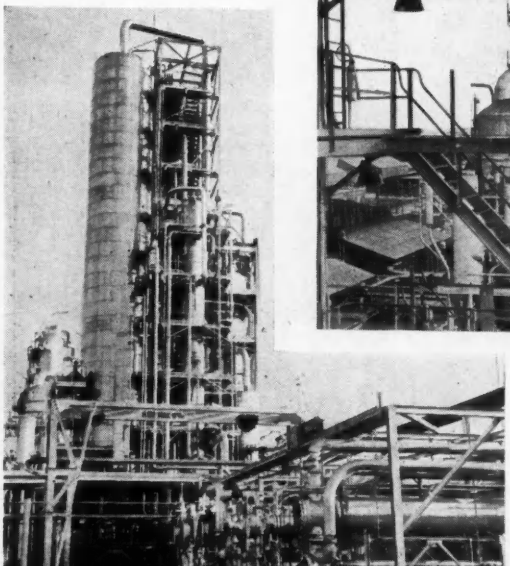
The Antwerp refinery went into production last October and its output in 1951 was 318,000 tons. Production is expected to reach 1,500,000 tons this year. The bulk of this production will be taken by lighter to distribution centres in the Benelux countries, but part will be exported to Switzerland by rail.

The products are marketed under the names of 'Purfina' and 'BP'. One of the refinery's by-products, butane, will be marketed under the name 'Petrogaz', through a company specially created for that purpose by the two parent groups. Plans are also afoot for the supply to an important Belgian chemical industry of special gases from the refinery.

The Antwerp refinery, of which construction had the full support of the Belgian authorities, is an important step in Belgian industrial progress.



A mid-level view of the No. 2 Distillation Unit



A general view of the No. 1 Distillation Unit

Promoting the Use of Natural Rubber

Incorporation of Rubber Technical Developments, Ltd.

ACTIVITIES of the British Rubber Development Board during 1951 in the United Kingdom, the U.S.A., Malaya, South Africa, and Australia are set out in some detail in the illustrated report (published in booklet form), which was distributed with the statement of the chairman, Sir Sydney Palmer, C.B.E., at the 14th annual general meeting of the Board held in London on 16 June.

Admiration for the planters, who for years now have carried on their daily work under conditions of continuous strain and danger, was expressed by the chairman, who said that even now the world did not sufficiently appreciate how dire would be the results if the production of rubber was brought to a standstill.

One of the most important events in 1951 was the incorporation of Rubber Technical Developments, Ltd., a unit jointly managed with the British Rubber Producers' Research Association with the object of developing, by means of pilot and semi-production scale equipment, the uses and applications of natural rubber.

In operation some 18 months before its incorporation, RTD by the wide variety of projects handled, had already shown its usefulness in overcoming delays which might occur in the application of scientific and technological work being carried out by the rubber producers' research and development organisations.

Cyclised Rubber Processes

Steady progress was made during the year in the development of processes for the manufacture of cyclised rubber from specially stabilised latex and concentrated sulphuric acid. The practicability of the process was proved and a sufficient quantity of material was produced for evaluation technically, not only by the BPRA, but also by a number of leading rubber manufacturing firms.

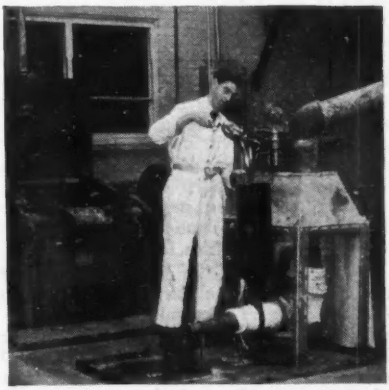
Commercial exploitation of oxidised and depolymerised rubbers was also investigated on a pilot-plant scale, quantities in excess of one ton being produced for evaluation by potential users.

One of the long-term projects, resumed since the war, was the Positex process for applying rubber to fibres.

Developments reported in America on the production of fabrics proofed with specially compounded Neoprene and showing appreciable permeability to water vapour while maintaining complete waterproofness suggested that investigation would be worth while to ascertain how far natural rubber could be used. The facilities at RTD enabled the laboratory work to be carried through to the stage of proving that commercial production was practicable and establishing the process before release to industry.

Inquiries received from various sources suggested that an investigation and some development work on the use of rubber for the manufacture of moulds for casting low melting alloys would be justified. Assistance was given to the interested firms in developing suitable natural rubber compounds for this purpose.

In the United Kingdom, perhaps the most important development of the year was the initiation of a co-operative research scheme between the Board and the Government's Road Research Laboratory. The scheme, which covers laboratory research and practical road trials, is planned to yield compre-



Pilot-plant production of depolymerised natural rubber

hensive, scientific information on the advantages that rubber imparts to a road. Reliable conclusions should be deducible in 1955.

The general programme included schemes to encourage the use of rubber in architecture, in building, in the home and in industry. During the year 11 new publications were produced, and eight were reprinted to meet the maintained demand. The reprints included 'Rubber in Chemical Engineering' (5,000 copies) and 'Rubber Adhesives in Industry' (2,000 copies). Distribution of the quarterly journal 'Rubber Developments in 1951,' averaged 7,000 copies a quarter, an increase of 1,000 a quarter over the previous year.

A survey of agricultural organisations and colleges in Great Britain, conducted during the year, indicated that lectures on rubber and its part in agriculture would be useful, and a scheme of lectures, suitably supported by literature and visual material, has been planned. This will be put into effect when the services of a qualified expert have been secured.

Road Research Laboratory

In the U.S.A. attention was focused on the importance of incorporating rubber in roads by the completion of staffing and equipping of the Natural Rubber Bureau's new road research laboratory in Virginia, which is claimed to be recognised by leading highway authorities as one of the finest in America.

An important part was played by the local office of the Board in Malaya in connection with a supply of rubber powder urgently required to fill the demand from the U.S.A. The local manager of the Board assisted in organising the necessary pilot plant and devoted considerable effort to encouraging the production of rubber powder by commercial firms.

In its second year of existence, the South African office expanded in every phase of it's work. Special efforts were directed at two industries where potential consumption of rubber in South Africa is large.

First in roads. A further rubberised stretch was laid on a heavily-trafficked road in Cape Town. Secondly, in agriculture, particularly at the Rand Show where the Board's display was visited by some 30,000 people and a bi-lingual brochure 'The Uses of Rubber in Farm Equipment', aroused much interest. Prominent among the inquiries dealt with were those on latex foam, for which the rapidly increasing demand outpaced supply.

The Australian office was opened in Melbourne on 1 February, 1951. To give some publicity to the event and to make known the Board's functions, press publicity was augmented by a lecture tour of the capital cities.

Special attention was paid to the provision of technical advice to both the rubber-consuming and rubber-manufacturing industries. Inquiries on such subjects as rubber bonding to metal, formulations for latex casting, and the stress/strain properties of rubber were typical of those dealt with during the year. Non-technical information on rubber (for example, statistics, and so on), was also supplied on a number of occasions to industry and Government Departments.

Prices Falling in Sweden

PRICES are reported to be falling on Sweden's chemical market. Most buyers are living on their stocks and many firms which found a brisk demand for their products only a few months ago, now find a stiffening sales resistance.

The situation in the glass industry has shown a marked change. Whereas last year it was a keen buyer of chemicals, buyers now say they have bought all their needs for this year.

Similarly the paper industry had great difficulties in obtaining enough sulphur last year. Now, firms occasionally find that clients are refusing to buy because they are fully stocked. The natural consequence has been an easing in prices.

Most of the heavy chemicals, however, are still firm. An exception is calcined soda which has been reduced by 15 kroner a ton.

Metal pigments show a steady decline and the quantities of zinc-white imported from Poland have been much reduced. Poland is now believed to be selling zinc-white at the lowest price in Europe.

Prices of metal salts in Sweden have fallen, but only slightly. Raw naphthalene which has been fluctuating widely is now selling at 1.10 kroner to 1.25 kroner a kilo, compared with 2 kroner a couple of months ago. A year ago the price was only 30 öre a kilo. Shellac has also eased.

Casein which cost 4.10 kroner last August is now selling at 1.50 kroner.

Ion Exchange Metallurgical Waste Problems

by F. X. McGARVEY

(Rohm & Hass Co., Philadelphia, Penn.)

This paper, the first part of which appeared in THE CHEMICAL AGE, *vol.* **66**, *pp.* 935-940, *was presented at the Seventh Industrial Waste Conference held at Purdue University, Lafayette, Indiana, 7-9 May. The Editor is indebted to the organisers of the conference and to Mr. McGarvey for permission to publish it. Altogether more than 40 papers were read and these will be published by the University in the proceedings.*

A CYCLE with a weak base exchanger, IR-45, in the hydroxide form gave essentially no capacity for sodium chromate. When this bed was converted to the sulphate form, a chromate capacity of 40 lb. $CrO_4^=$/ft.^{3} was obtained. The bed could not be regenerated effectively except by long contact with caustic or by use of a hot chloride solution.

These preliminary results indicate that chromate concentration on strong base anion exchangers provide a convenient method for treating dilute solutions of this difficultly handled substance. Table IX demonstrates the economics of this procedure.

Cyanide Concentration

Cyanide wastes are particularly objectionable. Strong base exchange resins operating in the hydroxide cycle have been used successfully in concentrating this weak acid. Losson and Bloodgood[4,9] have used another ion exchange approach successfully. Cyanide may be adsorbed from solution on a strong base anion exchange resin according to the following equation:

$$ROH + \left\{ \begin{matrix} NaCN \\ \longrightarrow \\ HCN \end{matrix} \right. \quad RCN + NaOH$$

For effective operation, the solution is usually passed through a bed of cation exchanger in the hydrogen cycle. The solution may then be degassed if sufficient ventilation is available and the residual cyanide in solution picked up on a second bed containing Amberlite IRA-400 or IRA-410. Since this treated water will be of high quality, free of impurities, it may be recycled to the processing step which will reduce costs. Frequently, the cost of exchange may be reduced by the savings in water cost. In addition, good control can be placed on water quality which is desirable for silver plating operation.

Miscellaneous Metals

Nickel is frequently found in plating rinses. This material may be concentrated effectively on a strong acid cation exchanger. Its properties are similar to zinc. This problem is being studied actively particularly when nickel cyanide complexes are involved.

Lead is not a common waste problem owing to the insolubility of its salts; however, where it does exist, the problem may be very serious due to the accumulation of trace quantities in the human system. Recently, reports from Europe[8] describe the use of a cation exchange resin for the concentration of lead wastes. The method was quite successful and lead values were reduced to zero. Amberlite IR-120 would exhibit a capacity of 19 lb./ft.^{3} under normal operating conditions with no competing ions.

Vanadium, tungsten, tin and other metals which form insoluble hydrous oxides may be precipitated by passage of their soluble salts through beds of cation exchanger in the hydrogen cycle.

$$\left. \begin{matrix} NaVO_3 \\ Na_2SnO_3 \\ NaSbO_3 \\ Na_2WO_4 \end{matrix} \right\} + RH \longrightarrow RNa + \left\{ \begin{matrix} VO_2 \\ SnO \\ Sb_2O_3 \\ WO_3 \end{matrix} \right\} + H_2O$$

TABLE IX

Economics of Chromate Concentration

Resin	*Reg. level, lb./ft.^{3} Na_2CrO_4*	*Concentrated Value of Chromium lb.*	*Value ($)*	*Value Reg. ($)*
XE-98	10 lb. NaOH	2.18	0.284	0.30
XE-98	10 lb. Na_2SO_4	1.44	0.187	0.10
IRA-410	10 lb. NaOH	1.78	0.221	0.30
IRA-410	10 lb. $NaSO_4$	1.25	0.162	0.10

Strong base resins will remove these metals by forming their salts of the exchanger. Either method is suitable for concentration of these materials but normally the anion exchange procedure will give lower leakages and good control of end-point. Uncertainty in precipitation rates makes the cation exchange resin procedure unsuitable for concentration of wastes, since large settling tanks may be required.

Purification and Regeneration of Potential Waste Solutions

Normally, when a pickle acid or an anodising bath becomes contaminated with metals to the point that it is no longer effective, it is dumped to waste. This may involve neutralisation and precipitation or a gradual drainage into the waste stream. This operation causes a considerable load on the waste disposal system and, in addition, valuable metals are lost.

Costa[6] investigated a method for the purification of chromic acid anodising baths by ion exchange. These baths became contaminated with iron and aluminium, which must be removed if the bath may remain effective.

Chromic acid is a weak acid. The *p*H of a 10 per cent chromic acid bath is about 0.5, and exchange reaction can occur between sulphonic acid cation exchangers and trivalent iron and aluminium. Synthetic resins such as IR-120 are resistant in chromic acid at least up to 10 per cent strength. That the operation is successful may be seen in the following table taken from Costa's paper.

TABLE X

Chromic Acid Treatment by Cation Exchange Resin

Metal	*Influent*	*Effluent*
CrO_3	72.6	69.4
Al_2O_3	7.74	1.52
Fe_2O_3	0.9	0.3
CuO	0.19	0.04
Mn (?)	0.00	0.001
*p*H	0.65	0.34

The economics of this process are very attractive since the bed may be regenerated with low value sulphuric acid. Based on 100 cycles, Costa reported that a 10 ft. bed of IR-120 would cost $9.89 per cycle while $30.10 per cycle of chromic acid would be recovered. This cost includes cost of disposal of spent regenerant.

A similar process has been reported recently for the recovery of phosphoric acid pickle by the removal of iron with a cation exchange[13]. This process also depends on the relatively slight ionisation of concentrated phosphoric acid pickle, which allows its passage over a bed of strong acid cation exchanger without greatly interfering with the exchange of trivalent ions on the resin.

The regeneration of pickle acids in the steel industry has been a subject of great interest in recent years. The volume of waste from these streams is tremendous. The recovery of iron alone would amount to over a million tons yearly. At the present time, sulphuric acid is widely used for pickling. When this acid reaches about 5 per cent iron salts and the acid strength has been reduced to the point where it is no longer effective, the pickle tank is dumped, the acid neutralised, and the iron precipitated.

Studies at the Oak Ridge National Laboratory[11] have shown that certain metals such as iron, tantalum, nickel, cobalt, zirconium, and hafnium will undergo exchange on strong base anion exchange resins from concentrated hydrochloric acid solutions by virtue of complex formations having the general formula MCl_4^-. For a given metal, a certain critical hydrochloric concentration is desirable. The concentration for iron is about 6 molar.

Samples of Amberlite IRA-400 were found effective for completely removing ferric iron from typical hydrochloric pickle solutions. Capacities of 0.4 lbs. Fe^{+++}/cu. ft. of resin were obtained. When the bed became exhausted, the column could be completely regenerated simply by cutting the concentration of hydrochloric acid below the critical point for complex formation. Since only ferric iron was removed, studies have been undertaken in order to establish conditions for the oxidation of ferrous iron to ferric. These studies are now under way on a pilot-plant scale. Since hydrochloric acid is an excellent pickle acid, this process may play an important role in steel production. Efforts to apply the process to sulphuric acid failed, since iron complexes do not form in this solution.

For list of references see part I of this article.

Chile Treats Ores

A new plant at the Chuquicamata copper mine for the treatment of sulphide ores—which U.S.$82,000,000 have been spent so far this year—is expected to be completed and operating early in 1953.

The Poly-Siloxanes

Recent Belgian Work on Two New Reactions

IN a paper presented at the 3rd National Science Congress in Brussels and just published (*Ind. Chim. Belge.*, 1952, **17** (5), 481-486—May) C. J. Guiellissen and A. Gancberg review their earlier work on the two new reactions for organo-silicic polymers and add some further experimental data. Unlike the well-known hydrolysis condensation their method ensures that the siloxane bond is always formed from two different functional groups, among which identical groups cannot mutually react. This gives a flexibility and precision to the method not possible, it is said, by the hydrolytic method.

A. Considering first the condensation of the halogeno- and alkoxysilanes, if a mixture in molecular proportions of silicon tetrachloride and ethyl *o*-silicate be heated in the presence of a catalyst such as ferric chloride, ethyl chloride is formed at about 80°C., together with the siloxane bond, by condensation. The mixture subsequently gels, and evolution of ethyl chloride slows down. The amount of this produced before gelling is 25-45 per cent of the total chlorine. If one starts with chloro- and ethoxysilanes more or less substituted by organic radicals, reaction proceeds to the almost complete elimination of Cl atoms and ethoxy groups, and the product is a silicone. The reaction is thus general for silanes.

For di-substituted silanes, the di-siloxane formed may react in either of two ways, in both of which the molecular chain continues to lengthen. Various advantages and possibilities of the new reaction are indicated, and some results tabulated using products of hydrolysis and of the new method (UCB) in the formulation of a silicone varnish. The principle results for resin 23 (UCB, with data in brackets) and for resin 24 (hydrolysis) were: yield 88 per cent (88 per cent), appearance turbid (clear), colour light yellow, volatile 55.2 per cent (23.8 per cent), setting time 24 hr. (18 hr.); film surface, cracked and lumpy (hard and smooth), intrinsic viscosity 0.0185 (0.0306). Among the advantages noted are not only ease and precision of operation, but also the fact that products such as silicon tetrachloride and ethyl silicate are easily obtained and inexpensive. The mechanism of condensation is such that the possibility is excluded of the formation of polymers from several molecules of a tetravalent (functional) compound, which proves very inconvenient in the hydrolysis process. Some comparative tests with varnishes made from monomers obtained by the new process and by hydrolysis, gave the results shown in the table below.

The rate of condensation of chloro- and ethoxysilanes may be easily controlled, both through the kind of catalyst used and the extent of heating; and different products may be obtained by varying the conditions of condensation, including silico-organic compounds that are difficult if not impossible to obtain by hydrolysis, of which tetra-tri-methylsiloxy)silane is described by way of example. The amount of ethyl chloride formed may reach 80 per cent of theoretical, and may be used direct for obtaining organo-magnesium, thus reducing the cost of the silicones.

In regard to the mechanism of the reaction and catalysts, it has been shown earlier that in condensing in the presence of aluminium chloride this acts both as catalyst and as reagent; and other chlorides, for instance, of iron, zinc, and calcium, may also be used. Of these ferric chloride is the most active when used to the extent of 0.1 to 1 per cent of weight of chlorosilane. It acts entirely as catalyst without any apparent secondary reactions. It has been shown further that if this substance is heated with ethyl silicate. ethyl chloride dissociates, and it appears that there is temporary formation of ferro-ethyl silicate, so that the mechanism of catalysis is analogous to that for aluminium chloride.

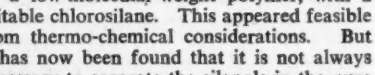
The method may be used with or without

Resin	*Process*	*$SiCl_4$ Per cent*	*R/Si*	*Yield in Si Per cent*	*Volatile Per cent*	*Yield of fixed resin*	*Remarks*
P.P. 67	U.C.B.	20	1.6	95	30.95	65.5	—
„ 71	„	25	1.5	98	21	77.5	—
„ 73	„	30	1.4	92	26.7	66.5	—
„ 76	„	35	1.3	about 100	27.3	72.7	Polymerising tendency
„ 72	Hydrolysis	20	1.6	83	43	47.2	—
„ 74	„	30	1.4	60	30.8	41.5	—

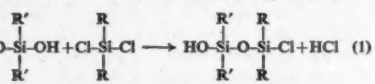
solvents. In either case there are certain advantages and disadvantages, with yield of different products. Yield of silicone calculated on the amount of chloro- and ethoxysilanes used is 70-80 per cent in the first case and 85-98 per cent in the second. In the one case owing to secondary reactions the ethyl chloride is recovered in the form of HCl and in the other 80 per cent is recovered pure.

New Reaction

B. *Condensation of chlorosilanes and silanols.* This new reaction for polysiloxanes (Belg. pats. No. 484,565, 491,766-7) is, like the first, also based on formation of a siloxane bond by two different functional groups: chlorine and hydroxyl. It is known that certain silanols formed by hydrolysis of halogeno- or alkoxysilanes, especially those with organic radicals of high molecular weight, react slowly among themselves and may often be separated in the pure state. The new reaction in its original form consisted in reacting a silanol, isolated pure or as a low-molecular-weight polymer, with a suitable chlorosilane. This appeared feasible from thermo-chemical considerations. But it has now been found that it is not always necessary to separate the silanols in the pure state, they may be formed in the presence of a solvent under suitable conditions, to avoid inter-polymerisation, and a chlorosilane may be reacted with a silanol solution and the two molecules condensed, thus:—



The advantages mainly derive from the fact that this condensation is bi-functional and similar to those described by the authors for their first reaction. The possibilities are somewhat more limited, as the condensation in this case requires that the silanols formed are relatively stable. Thus, the above reaction is of little use for condensing ethyl- or methyl-silanes and -silanols, for example, but is well adapted for condensing phenyl silanols with methy- or ethyl-chlorosilanes, thus:—



In this connection reference is made to an article by C. Burckhard *et al.* 'The present state of organosilicon chemistry' (*Chemical Reviews,* 1947, **41** (1), 123—August); and it is pointed out that the mechanism therein described—condensation of silanols and hydrolysis of the chlorosilanes by water formed—is not applicable in the present case. In fact, under suitable conditions 80 per cent of the chlorine in the chlorosilanes is eliminated at ordinary temperature when condensation is sufficiently slow. No catalyst is required.

In the production of polysiloxanes, as, for example, for varnishes, as described in previous papers, the reaction may be with or without solvent and mostly at ordinary temperature (Belg. pat. 491,767). The products contain no foreign admixture (catalyst) and may be used without washing.

The two processes described herein and to some extent in earlier papers (1948-49) may be used for obtaining various organosilicic products for use as varnishes, and liquid silicones with only slight variation of viscosity with temperature, and as fats or greases.

Editor's Note:—There is little doubt that the chemistry and technology of the silicones and numerous derivatives are advancing rapidly. Another example of this progress is to be found in the recent publication of several British patents by Dow Corning, of which a brief review will be given in a later issue.

German Plastics Fair

THE German plastics industry holds its first post-war exhibition in Dusseldorf from 11 to 19 October this year. The fair is open to the producers of plastic materials, manufacturers of plastic articles, manufacturers of machines, apparatus and tools for the treatment of plastics, and producers of testing instruments and accessories. In addition to plastics, chemical fibres will be shown. The exhibition area covers 31,100 sq. yards in halls, with additional open air space. During the fair the annual conference of the German Plastics Association will be held in Dusseldorf. The conference is organised by the German Plastics Manufacturers' Association (Arbeitsbemeinschaft der Deutschen Kunststoff-Industrie) together with other technical and scientific organisations such as the Plastics and Rubber Group of the Society of German Chemists, the Plastics Group of the Federation of German Engineers, and the Special Plastics Group in the German Standards Institution.

MIDLANDS SOCIETY FOR ANALYTICAL CHEMISTRY

Calcium, Barium & Strontium

At the final meeting of the 1951-52 session of the Midlands Society for Analytical Chemistry held at the University, Birmingham, the subject was 'The Analytical Chemistry of the Alkaline Earths'. Two members of the Society from the Nelson Research Laboratories of the English Electric Co., Stafford, read papers. The following is the first of these, presented by Mr. H. Thomas, B.Sc., A.R.I.C., on 'The Analytical Chemistry of Calcium, Barium and Strontium; the first part of which appeared in THE CHEMICAL AGE, **66**, 923-925.

KALLMAN (1948) separates the alkaline earths using the Willard and Smith reagent (20 per cent hydrogen chloride in *n*-butanol). From the butyl alcohol solution of the perchlorates of calcium, barium and strontium the Willard and Smith reagent precipitates the chlorides of barium and strontium. Calcium chloride is very soluble. From an aqueous solution of the chlorides of barium and strontium a 4:1 mixture of 11N hydrochloric acid and *n-butyl* alcohol precipitates barium, but not strontium chloride. A small correction must be applied for the solubility of barium chloride in this mixture. Sodium and potassium and large amounts of ammonium salts must be absent. It is convenient to precipitate the alkaline earths with ammonium carbonate and convert to perchlorates. Small amounts of potassium (but not sodium) may be removed as perchlorate from butyl alcohol solution prior to adding the Willard and Smith reagent. Lead must be absent. It is best removed by electrolysis. The same author (1949) has also outlined a scheme for the analysis of barytes.

Arden *et al.* (1948) have separated mixtures of the alkaline earths by paper chromatography. Calcium, strontium and barium are separated as the chlorides using as solvent pyridine containing 4 per cent of potassium thiocyanate. Calcium travels the greatest distance down the paper, barium very little and strontium appears between the two. Sodium rhodizonate is employed for the development of the barium and strontium, and alizarin for the calcium. Burstall *et al.* (1950) recommend pyridine containing 20 per cent of water and 1 per cent of potassium thiocyanate. Good separations are not, however, obtained with these mixtures, barium travelling down the paper like strontium. Miller and Magee (1951) recommend a mixture of *n*-butanol and concentrated hydrochloric acid, saturated with *n*-butyl chloride. Good separations are obtained with this mixture.

THE DETERMINATION OF CALCIUM

The classical oxalate methods are still the most widely used for the determination of calcium. The most suitable weighing forms are anhydrous calcium oxalate, calcium carbonate and calcium oxide, although the oxalate can also be converted via the oxide to the sulphate and fluoride. Volumetric methods depend on the solution of the oxalate in sulphuric acid and subsequent titration of the liberated oxalic acid, permanganimetrically or cerimetrically.

Colorimetric Methods

Colorimetric micro procedures have been described in which the calcium oxalate precipitate is dissolved in acid and treated with an excess of permanganate. The excess permanganate is then estimated colorimetrically. Sendroy (1942) treats the oxalate solution with excess ceric solution and then adds iodide to obtain the strongly coloured triiodide ion. In other procedures the oxalate ion is estimated by the bleaching effect on ferric iron complexes with thiocyanate or acetylacetone. Sobel and Kaye (1940) have described an iodometric micro method in which the calcium is precipitated as oxalate, converted to carbonate by ignition and the carbonate dissolved in an excess of 0.01N hydrochloric acid. The excess acid is determined iodometrically by the addition of excess iodate-iodide mixture. The liberated iodine is determined by titration with very dilute sodium thiosulphate solution using starch as indicator.

The direct titration of calcium with oxalate based on the following principle has been described by Kutschment and Gengrinovitch (1945, 1947). Cacotheline is not normally reduced by ferrous iron; when, however, compounds are added which form complexes with ferric iron the ferrous-ferric potential is lowered and cacotheline can be

reduced to give an intensely coloured violet compound. In the titration procedure 1 ml. of saturated cacotheline and one drop of ferrous sulphate are added to a neutral 0.1 M sodium oxalate solution. When all the calcium has been precipitated the free oxalate ions lower the potential of the ferrous-ferric system to such an extent that the cacotheline is reduced. The magnesium-calcium ratio may be 5: 1.

Direct Fluoride Titration

Uri (1947) has shown that calcium may be titrated directly with fluoride. The solution contains ferrous and ferric ions, and when all the calcium has been precipitated the FeF_6^{-3} ion is formed causing a rapid drop in the oxidation-reduction potential. The titration is carried out in 50 per cent ethanol saturated with potassium chloride. The change in redox potential is measured potentiometrically by means of a bright platinum electrode dipping into the solution.

When a dilute aqueous solution of picrolonic acid is added to a warm neutral solution of a calcium salt, calcium picrolonate is precipitated. After long standing, the precipitate may be filtered on sintered glass, washed with a little water and air dried. Magnesium and the alkalies may be present in amounts up to ten times the amount of calcium present, but lead, thorium, barium, strontium and copper must be absent. Bolliger (1935) precipitates calcium with a measured excess of picrolonic acid and then titrates the excess with methylene blue, the methylene blue picrolonate being removed from the aqueous phase by means of chloroform. The titration is effected in a phosphate or carbonate buffer and the end-point occurs when the chloroform fails to remove the blue-green colour formed in the aqueous layer on the addition of a few drops of methylene blue solution. The titration is very inconvenient since methylene blue picrolonate is markedly soluble in water and the chloroform must be replaced several times during the titration.

Van Slyke and Kreysa (1942) have determined calcium in the picrolonate precipitate by a rapid manometric wet combustion method. The precipitate contains 20 carbon atoms for each calcium atom, and 0.2 mg. of calcium can be determined.

Alten *et al.* (1923) have developed a colorimetric method in which calcium (2 — 150 γ) is first isolated as picrolonate, then dissolved in hot water and treated with bromine water. The mixture is heated on a water-bath for 10 minutes, ethanol added and the mixture cooled. On adding excess sodium hydroxide a red colour is formed which is proportional to the concentration of picrolonic acid. Magnesium and the alkalis do not interfere. Iron and aluminium may be masked with sulphosalicylic acid, Klement (1948) and Mackareth (1951) describe other colorimetric procedures based on picrolonate precipitation.

In 1950, Flaschka and Spitzy described the gravimetric determination of calcium using either ammonium or potassium ferrocyanide as precipitant. Further, the precipitate could be titrated after solution in dilute sulphuric acid with permanganate or ceric sulphate. Belcher, Nutten and Stephen (1951) titrate calcium directly with ferrocyanide using 3: 3′-dimethylnaphthidine as indicator.

Several organic reagents (other than picrolonic and oxalic acids) have been advanced for the determination of calcium. Ferron (7-iodo-8-hydroxyquinoline-5-sulphonic acid) has been used by Schoorl (1939) with satisfactory results. Tyner (1948) bases a colorimetric method on the measurement of the colour diminution which accompanies precipitation of calcium chloranilate from the intensely coloured chloranilic acid. Iron and magnesium interfere although in the procedure of Gammon and Forbes (1949) this is overcome. Pyrogallolcarboxylic acid as a reagent for the alkaline earths was rediscovered in 1948 by Chac and Pech. They have found that the blue-violet complex with calcium is suitable for colorimetric measurement, under certain conditions. Several metals and ions interfere although calcium can be determined in the presence of aluminium, magnesium and zinc. The coloured complex of calcium with ammonium purpureate (murexide) has recently been advanced by Ostertag and Rinck (1950) for the direct colorimetric determination of calcium. Magnesium reduces the sensitivity of the reaction.

Use of EDTA

The direct titration of calcium with EDTA (ethylene diamine tetra-acetic acid) has been adequately discussed in a recent report of this society; the work of Duval and Peltier on the precipitation of calcium in the presence of magnesium was also reported in

detail. Neither topic will be discussed further here.

Barium is normally precipitated and weighed as the sulphate. Elements such as lead, strontium and calcium interfere because of the low solubility of their sulphates. Lead and calcium sulphates may be removed by extraction with a solution containing ammonium acetate and ammonium sulphate. The precipitation of barium sulphate should be carried out from a boiling solution containing not more than 1 per cent of hydrochloric acid. Nitrates must be absent. Agar-agar and gelatin have been suggested as coagulants for barium sulphate precipitates.

Schroeder (1933) has titrated barium with a standard sulphate solution using tetrahydroxyquinone as indicator. The ethanolic barium solution is titrated with standard potassium sulphate solution to the disappearance of the red colour of the barium salt of the indicator. Miller (1940) prefers the barium salt of rhodizonic acid as indicator in this titration.

Barium may also be precipitated as chromate in a buffered acetic acid-acetate medium. The precipitate is washed with dilute ammonium acetate solution to remove excess chromate, then with dilute alcohol, dried at 110°C. and weighed.

Volumetric methods are possible when the washed precipitate of barium chromate is dissolved in acid and the dichromate estimated by normal procedure. Alternatively, an excess of potassium dichromate may be added, the precipitate of barium chromate filtered off, washed and the excess of dichromate estimated.

Two Colorimetric Determinations

Two colorimetric methods are available for the determination of barium; either the washed chromate precipitate is dissolved in hydrochloric acid and the adsorption of this solution measured, or the chromate in the precipitate is determined by means of diphenylcarbazide.

Barium carbonate is precipitated by adding a slight excess of ammonium carbonate and allowing the precipitate to settle in a warm place for an hour or more. The precipitate is filtered off, washed with dilute ammonium hydroxide, and ignited and weighed as $BaCO_3$. For a volumetric finish the washed barium carbonate is dissolved in excess standard acid and the excess acid determined. It is possible to suspend the carbonate in water and titrate directly with standard acid using methyl orange as indicator.

Barium iodate is precipitated by adding an excess of saturated potassium iodate. The precipitate rapidly settles, is filtered on sintered glass, dissolved in sulphuric acid, potassium iodide added and the liberated iodine titrated with thiosulphate.

The Determination of Strontium

To precipitate strontium sulphate a tenfold excess of dilute sulphuric acid is added to the neutral strontium solution and then a volume of alcohol equal to the volume of the solution. This mixture is stirred well and allowed to settle for several hours. The precipitate is filtered and washed, first with 50 per cent alcohol containing a little sulphuric acid and then with alcohol until free from acid. Strontium may be determined as oxalate as described under the determination of calcium. Strontium oxalate is more soluble than calcium oxalate and some strontium will avoid preciptation unless alcohol is added. Finally, strontium may be precipitated as carbonate by adding a slight excess of ammonium carbonate to a weakly ammoniacal solution. A large excess of ammonium salts must be avoided since they exert a solvent action on strontium carbonate. The washed precipitate is ignited and weighed as $SrCO_3$.

B.S. for Glass Stopcocks

A NEW British Standard (B.S. 1751: 1952) has recently been prepared to cover a range of glass stopcocks suitable for general use in laboratory apparatus, and to which cross-reference may be made from other specifications. This specifies six types and 25 sizes of stopcocks, including burette stopcocks. The basic range of bores has been so chosen that the area of the bore through any key is approximately double that of the next smaller size. The ratio between length of key and diameter of key at the bore has also been chosen so that the peripheral leakage path between the ground surfaces is approximately equal to the longitudinal leakage path.

The Standard gives full dimensions and constructional details for a good quality stopcock but, in accordance with current practice in British Standards for volumetric glassware, these details are for guidance, instead of being mandatory.

Chemicals in Canada

Problem of 'Growing Pains'

CANADA'S increasing influence in the chemical world is reflected in the 1952 edition of the official handbook 'Canada' just published by the Bureau of Statistics. The leading article, 'Canada in the Chemical Age', is a comprehensive word-picture of the dominion's fast-growing chemical industry.

The industry is, however, suffering from growing pains. It needs more trained personnel. At present there are about 9,000 chemists and chemical engineers in the field. Until the population and secondary industries increase, many chemical lines cannot be manufactured on a profitable basis.

Some idea of the wide range of expansion may be gathered from the use of power-packed rivers of Northern Quebec to develop electro-chemical industries; probing of the petro-chemical field in Montreal; nuclear fission investigation at Chalk River, Ont.; and the development of nylon at Kingston and synthetic rubber at Sarnia.

Actually the chemical industry in Canada is centuries old. It began in 1674 when the intendant of New France, Jean Talon, granted to Nicholas Follin of Quebec the exclusive right to make potash from hardwood. As Canada expanded it brought chemistry into play in its development of metallurgical industries in Ontario and British Columbia. Electrochemistry was born as Canadians began harnessing water power. Two world wars brought about accelerated development in all phases.

Basis of the Industry

Three main groups form the basis of the industry. Firstly there is the manufacture of commodities—products seldom seen by the public in their original form and known only by their chemical names, such as caustic soda, sulphuric acid and ammonia. Although these provide a basis for industry they comprise less than one per cent of the value of all Canadian manufacturing output.

Officially classified as 'chemicals and allied products,' the second group comprises heavy chemicals together with explosives, primary plastics, pharmaceutical chemicals, coal-tar distillation products, and so on, also several other industries such as paints and soaps.

This group has an annual output representing approximately five per cent of the value of all manufactured goods. In 1950 the value of production soared to $636,000,000—four times the amount produced in 1939. The physical volume of output rose 120 per cent in the same period compared to an 85 per cent increase for all industry. Canada's chemical exports alone are valued at $100,000,000. The chief exports are fertilisers and synthetic resins.

The third group, while not classified as chemical, depends on chemical processes. It includes non-ferrous metal smelting and refining, pulp and paper manufacture, petroleum refining, rubber, glass, etc. Its total annual production is approximately 30 per cent of that of all manufacturing industries.

Institute of Welding

This Year's Meeting to be in Sweden

SWEDEN will be the scene of this year's annual meeting of the Institute of Welding which will be held at Gothenburg from 7-13 September, by invitation of its Swedish member societies.

The first item on the programme is a meeting of the governing council of the Institute on 7 September. The following four days will be devoted to meetings of the 15 technical commissions composed of representatives appointed by the societies belonging to the Institute.

On the morning of Friday, 12 September, visits have been arranged to shipyards and other works in Gothenburg and in the afternoon four papers on 'Welding in Shipbuilding' will be presented by representatives of France, Great Britain, Sweden and the U.S.A. The author of the British paper is Mr. H. H. Hagan.

A meeting of the governing council will close the assembly on 13 September, after which those taking part will be free to join in a programme of works visits in Stockholm, Malmo and other industrial centres, organised by the Swedish member societies.

Entertainment planned for the benefit of delegates, includes a reception given by the Gothenburg City Council on 8 September and a banquet given by the host societies on 11 September.

Full particulars of the meeting and enrolment forms may be obtained from Mr. G. Parsloe, secretary-general, The International Institute of Welding, 2 Buckingham Palace Gardens, London, S.W.1.

Additional Capital Required by Laporte

Record Home & Export Sales in 1951

A FURTHER advance in the earnings of the group is announced by Mr. L. P. O'Brien, chairman and managing director of Laporte Chemicals, Ltd., in his statement which will be submitted at the 45th annual general meeting to be held in London on 10 July.

An increased capacity for production of the main specialities of the group occurred in time to take advantage of a strong demand. In the year ended 31 March, 1952, sales in both home and export markets were a record by weight and value and trading profit of the group rose from £843,000 to £988,000.

There was, however, a slackening-off in forward demand in the first quarter of this year, which had continued to date. Despite this, the main plants had continued to be run at full capacity and earnings were maintained in the last three months of the group's financial year.

Heavy capital outlays of tax disbursements and stock financing needs had caused the liquid resources, which had diminished in the past financial year, to be still further reduced. In fact, by the end of May last, the group had exhausted its cash balances and was now relying on bank credits. Later in the year, therefore, it was expected that the company would outline its plans for raising about £2,000,000 of additional capital.

Offices Transferred

During the year, the registered offices of the parent and English subsidiary companies had been transfered to Hanover House, London, W.1, which was now the headquarters of the management. Having five works in Bedfordshire, Lancashire, Lincolnshire, and Yorkshire, besides mines in Westmoreland and Devonshire, it was convenient for all concerned that the chief executives of the parent company should be centred on London.

To simplify the structure of the group and cut out unnecessary inter-company work, five subsidiary companies had been wound up and the respective business were now being conducted on a departmental basis.

Laporte Acids Limited was now engaged in building at Hunt Works a new sulphuric acid plant designed to burn pyrites; the rated capacity was 100 tons per day of 100 per cent acid. A significant part of the output of this new plant had been sold for some years ahead. When the new plant was constructed, if necessary, any residual value in older plant which was less efficient in operation or not so profitable to operate, would be written off. However, most of the older plants were in good condition, large sums having been spent on them to ensure their continued efficient operation even if there was no sulphur available as raw material in future years.

Recently, new laboratories had been built and equipped at Hunslet, and also a new canteen for the better comfort and well-being of the employees.

Importance of Hydrogen Peroxide

The new hydrogen peroxide plant, built at Baronet Works, Warrington, had been in operation for about two years. The first extensions to the original units of the Warrington plant were practically completed and gave the opportunity of further expansion.

Efficiencies and outputs of the hydrogen peroxide business had been improved, and it was still the mainstay of the parent company. Nevertheless, through the continual striving of the research department new methods were being evolved which showed good promise for the future.

Some major projects planned by the Laporte Group for cutting down expenses and making more goods were held up for lack of permission to embark on new capital jobs at the present time, but as soon as circumstances permitted these would be put into operation.

The biggest job in hand at present was the building by National Titanium Pigments, Limited, of the new titanium oxide plant with its attendant new sulphuric acid plant at Battery Works, Stallingborough, North Lincolnshire. These plants were likely to be completed by March, 1953. Meanwhile, N.T.P. results for last year were satisfactory based on the limited output at Luton.

Use of titanium oxide throughout the world had increased continually over the

last 25 years and in Great Britain, the U.S.A. and most of the other industrial countries, competitors were expanding their plants. However, it did not appear likely that there was any risk in the near future that extension of manufacturing capacity in the U.K. was being overdone, even though there was a temporary recession in the volume of world trade, and N.T.P. directors believed that their new plant could be operated at a satisfactory level.

Siting of the Battery Works was excellent from every point of view that needed to be considered when undertaking to build a large new works which would receive large quantities of raw materials from abroad as well as from home sources and, on the other hand, had to distribute its end product abroad as well as at home.

Increase in Loans

Under the heading of 'Investments' in the balance sheet of the parent company there was an increase in loans to subsidiary companies from £144,800 to £1,019,281. Of this, £750,000 was lent to National Titanium Pigments, Limited, towards paying for the construction of the new works at Stallingborough, and apart from £4,800 lent to the Australian subsidiary, the balance of £264,481 was an inter-company loan in connection with the liquidation of Hunt Brothers (Castleford), Lmited, and there was a corresponding reduction in the amount of the investments of shares in subsidiary companies which was affected by this transaction as well as by the liquidation of the other four subsidiary companies.

In conclusion, the chairman stated that there were indications that for some time ahead people here and abroad would be curtailing expenditure, which was practically bound to have some effect upon the group. Furthermore, there was a strengthening of competition from industrial countries such as Czechslovakia, Germany, Italy and Japan.

Despite these facts the future could be faced with confidence, and there were four main factors in the group's favour:—

(1). It was the manufacturer of essential chemical products for which there were bound to be new outlets in either good or bad times, as this was a chemical engineering age.

(2). There was a healthy, world-wide demand for a better standard of living. Chemical industries under modern conditions would be in the foreground to supply the ever-widening needs of the other basic industries.

(3). In spite of the problems of post-war difficulties the British chemical industry (including Laporte) had made, and would continue to make, great scientific progress by new discoveries as well as creating new product capacities and building up strong reserves.

(4). The group was fortunate in the good feeling between employers and employees who worked wholeheartedly together to overcome difficulties as they arose.

Chemical Institute of Canada

WITHOUT exception, every phase of the Canadian industrial picture is in a period of dramatic growth, declared John D. Fennebresque, vice-president of the Celanese Corporation of America at the 35th annual conference of the Chemical Institute of Canada held in Montreal recently.

Referring to the more important factors contributing to the future health of Canadian economy, Mr. Fennebresque specifically emphasised the importance of the chemical industry which, he said, had not yet come anywhere near to reaching its full potential. He foresaw remarkable expansions in the fields of synthetic detergents, chemically produced fibres, plastics, insecticides, agricultural chemicals and pharmaceuticals.

All of these products which contributed to raising the standards of living were dependent on a strong chemical industry, and many to petrochemistry.

The medal of the Chemical Institute of Canada was awarded to Dr. Otto Maas, chairman of the department of chemistry at McGill University, for meritorious work in furthering Canadian chemistry.

Dr. Maas spoke on 'Some Underlying Factors Involving the Processes of Wood Pulp Production,' and predicted that if certain problems were solved, it should be possible for pulps of a higher grade—perhaps even sulphite pulp—to be produced by a continuous procedure.

John D. Cipera, a 1948 Czechoslovakian refugee, was announced as winner of the Russell J. Eddy Prize of $1,000. After studying at Toronto and Guelph, Ontario, he is doing post-graduate work at McGill under Dr. R. V. V. Nicholls.

The Chemist's Bookshelf

TEXTBOOK OF ORGANIC CHEMISTRY. By Carl R. Noller. W. B. Saunders Company, Philadelphia and London. 1951. Pp. IX + 643. 29s.

The author of this book is Professor of Chemistry at Stanford University in California. The text is designed for students taking their first course in organic chemistry and is therefore well adapted to the needs of those studying for a London B.Sc. degree, or Part I of the Natural Science Tripos or equivalent examinations. The subject matter follows the conventional arrangement of discussing the simpler monofunctional aliphatic compounds first, followed by the aromatic compounds and then reverting to the more complicated polyfunctional compounds. In addition, there are chapters on heterocyclic compounds, dyes, synthetic rubbers and silicon compounds.

Obviously in a book of this type there is a set amount of material to be covered, but the author is to be congratulated in presenting the fundamental concepts of organic chemistry in a very lucid way. It should be pointed out that in order to combat the criticism that organic chemistry is merely memory work a chapter on the mechanism of organic reactions has been incorporated relatively early in the book. There are several novel features of the book of which two may be mentioned here. The first is that short biographical sketches are incorporated as footnotes whenever any eminent organic chemist is mentioned by name. This serves many useful purposes, not the least of which is that it will impress on students the idea that organic chemistry is not a 'dead' subject. The second striking feature is the many references to industrial methods of preparing the more important chemicals, and their importance is often substantiated by illustrative figures on annual production and consumption. Needless to say, most of these statistics relate to the United States, but nevertheless they serve to point out the large scale on which some organic compounds are now manufactured. All the chapters conclude with a selection of questions which will enable the student to test his grasp of the subject matter and in many cases selections for additional reading are also given.

The lucid style of the author is considerably helped by the high standard of printing and the many structural formulae and diagrams which are employed.—G. G. S. DUTTON.

PAINT TRADE MANUAL OF RAW MATERIALS AND PLANT. By H. W. Chatfield. Published by the author, distributed by Scott Greenwood & Son, Ltd., London. 1952. Pp. xlvii + 343. 32s.

The classification of information is a difficult and generally unrewarding task. Every different user has his own particular requirements and the information adequate for one manufacturer may tell another no more than he knows already. Dr. Chatfield has succeeded in producing a manual of paint technology which goes further than the usual buyer's guide to materials and plant, and gives extensive information on the materials it deals with. This will assist both the buyer and the technologist, and should enable a choice of materials to be properly made before the question of buying arises.

The directory covers a wide field. As well as a list of technical journals and reports, books, etc., relevant and useful to the paint trade, the reference matter concerning materials and plant is very full, and arranged alphabetically. In some cases physical properties of the materials are given, and their suitability for various uses. Recent patents likely to be of use are mentioned, and there is a comprehensive index at the end. Details of the more important specifications for raw materials and finished products are also given, with accounts of new developments. This directory is the only one of its type in the paint and allied trades, and should prove extremely useful. It is hoped to revise it yearly.—J.C.S.

Publications & Announcements

THE June edition of 'History Today,' edited by Peter Quennel and Alan Hodge (2s. 6d.), contains, among other articles, one on Ludwig and Alfred Mond and their contribution to industrial chemistry. It has been written by Dr. W. H. Chaloner, Senior Lecturer in Modern Economic History at the University of Manchester, and gives a vivid and interesting account of the lives of these great founders of I.C.I.

* * *

IT is often said that successful research fails to be carried through into practice. With this in view, favourable trials of condenser tubes made of the binary alloy 10 per cent tin-bronze are summarised in the May issue of *Tin and Its Uses* (No. 26), a periodical review issued by the Tin Research Institute, Greenford, Middlesex. The article, which is illustrated by two colour-plates, points out that some 750-1,000 tons of nickel (which is in short supply) are needlessly used each year for condenser tubes, whereas this could be done by one-third of the amount of tin, which is plentiful. 'Contact plating' of awkward jobs, such as large pipes tinned internally by the use of a plait of aluminium wire in lieu of internal anodes, is described in another illustrated article.

* * *

THE sixth chapter of the Air Pollution Abatement Manual, 'Sampling Procedures and Measuring Equipment,' has been issued by the Manufacturing Chemists' Association. This chapter sets forth the principles and methods to be followed in the collection of samples used for the study of air pollution problems, and describes various types of sampling equipment. The necessity for procuring the correct sample for a particular problem is emphasised, as well as the importance of statistical techniques in obtaining maximum precision. Problems of sampling in open atmosphere are indicated, with reference to gases, particulate matter, odours, and meteorological factors.

The second section of the chapter contains data about sampling equipment, with a description of the construction and positioning of sampling probes, their use in sampling ducts and stacks as well as sampling from locations above ground level. The final section of the chapter includes a bibliography, summary of sampling devices, and illustrations and diagrams of various types of equipment.

Orders for Chapter 6 should be sent, with remittance of 75 cents, to Manufacturing Chemists' Association, Inc., Woodward Building, 15th and H Streets, Washington 5, D.C.

* * *

'A GUIDE to better living' is the title of a summary of the Valve Industry Productivity Report which has just been published. The original report was issued on 9 July, 1951 (*see* CHEMICAL AGE, **65**, 51), and the summary contains pertinent extracts from it together with pictorial accompaniments. On each page are references to performance rates as seen in the U.S.A., and examples of tooling, ways of using power, handling of materials, and all the other factors which go towards higher productivity. The pamphlet, even if it is a little late off the mark, is very well produced, and should have a wide circulation.

* * *

SOME 500 miles of pipe, ranging in size from ¼ in. to 43 in. has been supplied by Stewart and Lloyds direct to the site of the Vacuum Oil Company's refinery at Coryton, together with over 2,250 tons of manipulated pipework. In addition (over and above the normal fittings supplied with manipulated pipework), welded fittings to the value of some £30,000 have been delivered. All the pipework under 16 in. diameter supplied direct to the site was seamless; that of 18 in. diameter upwards was manufactured by the lapweld process.

* * *

THE LATEST edition of *Colonial Geology and Mineral Resources*, the quarterly bulletin of the Colonial Geological Surveys (HMSO, 5s.), concerns itself mainly with the general and economic geology of Trinidad, British West Indies, the subject of its main articles. Trinidad forms the northeasternmost extension of the South American continent and is famous for its pitch lake. The other article in the bulletin is a progress report of the Colonial Geological Surveys. Summary reports on other British Colonies are also included as well as notes and abstracts and a section on book reviews.

HOME

To Form Subsidiary

Johnson, Matthey & Co., Limited, propose to form a subsidiary company in South Africa under the title of Johnson, Matthey & Co. (South Africa), Limited, with offices in Johannesburg. The initial objectives will be to meet from local production the industrial needs of South Africa for noble metals. Mr. J. A. Shaw, hitherto assistant manager of the Shepherds Bush works, London, has been appointed manager and will leave for South Africa in September, together with E. C. Deering, a director of the London company.

New Chemistry Department

Sir Robert Robinson, professor of chemistry at Oxford University, will open Aberdeen University's new £300,000 chemistry department in Old Aberdeen on 17 September. Building operations began in January, 1949, this being the first stage in the development of the new university precinct planned for Old Aberdeen. It is expected that all the laboratories will be completed in time for the opening of the winter term in October.

Copper Supplies

Asked whether, in view of improved supplies, it was intended to discontinue price control, licensing and distribution of copper, the Minister of Supply, Mr. Duncan Sandys stated in a written answer in the House of Commons on 19 June, that this was not practicable. Copper, he explained, was still subject to international allocation and supplies were still insufficient to meet current requirements.

Needs of Technical Colleges

Improvement in numbers with, in some cases, better quality of staff and radical changes in accommodation and equipment must be the aim of the technical colleges, declared Mr. E. L. Russell, chief education officer for Birmingham, when he addressed the Union of Educational Institutions at Southampton on 20 June. To attract the right entrants, Mr. Russell added, careers of students in technical colleges should be made more rewarding and an award of national currency for appropriate courses in higher technology was most desirable.

No Chemicals for China

Following recent discussions between a Chinese agency in East Berlin with business men who submitted to the Board of Trade lists of chemicals it was proposed to export from the United Kingdom to China, it was announced by the Board on 18 June that either on strategic grounds or owing to shortage of supplies, licences would be unlikely to be granted for the export of the greater part of the chemicals listed.

Lead Price Raised

The first increase in the price of lead for nearly a year was announced on 24 June, when U.K. lead was advanced by £4 to £133 a ton, delivered consumer's works.

Steel Scrap Salvage Vital

The importance of the steel scrap drive was emphasised by the Minister of Supply, Mr. Duncan Sandys, in a personal letter sent out on 24 June to the managing directors of 13,000 steel-consuming firms. The Minister points out that unavoidable reduction in imports of scrap from Germany make it essential to intensify the efforts to collect more scrap from home sources.

Zinc Price Cut Again

A further reduction in the United Kingdom price of zinc by £8 to £130 a ton was announced by the Ministry of Materials on 19 June. This is the third cut in the price of zinc this month. Since 22 May the quotation has come down by £60 a ton, and the new level is the lowest since September, 1950.

Zinc Scrap Decontrolled

In view of the improvement in zinc supplies the Minister of Supply (Mr. Duncan Sandys), has made an order, effective from 23 June, freeing secondary zinc, zinc alloys, zinc scrap and gunmetal scrap from price control. The Order, the Copper, Zinc, etc., Prices (No. 2) Order, Statutory Instrument 1952, No. 1184, also adjusts the prices of secondary copper, brass, copper scrap, gilding metal scrap, brass scrap and cupro-nickel scrap to take account of the recent changes in the Ministry of Materials selling prices of virgin zinc and copper.

• OVERSEAS •

U.S. Fears Sulphuric Acid Shortage

A demand for 19,500,000 tons of sulphuric acid in 1955 is estimated by American producers, but it is feared this may not be able to be met because of the continued shortage of sulphur. This was the view expressed by representatives of the industry at a recent meeting in Washington with members of the U.S. National Production Authority, although it was stated that the relation between supply and demand had improved since the beginning of this year.—B.U.P.

Saskatchewan Government Loses Appeal

An appeal against a court ruling limiting the royalties it can levy on two chemical companies, Midwest Chemicals, Ltd., and Whiteshore Salt and Chemical Co., Ltd., was lost by the Saskatchewan Government in Regina on 3 June. Before 1931, when the province's natural resources were under Federal control, the companies had agreed to pay the Provincial Government 12½ per cent a ton on mined salt. In 1947 and 1949 the Government passed orders-in-council increasing the payments and the companies objected. The Government may now have to return more than $50,000 collected in royalties from the two firms.

Chemical Supplies in Canada

Most chemicals have been in good supply in Canada, but sulphur and some of its derivatives continue to lead the 'hard-to-get' items, reports the Purchasing Agents Association of Toronto. An American steel strike would, however, show an effect on a long list of chemicals and intermediates if continued for any length of time. The chief items that would be affected are toluol, benzol, phenol, cresylic acid and xylol. These chemicals are coal derivatives, but only 25 per cent of United States production is derived from the steel industry. Canadian supply is produced from both coal and petroleum processes. Demand for some alkalis has dropped. Caustic soda, chlorine and soda ash are in satisfactory supply. Numerous European chemicals are offered at prices lower than those in effect one year ago, especially fluorides.

More Japanese Fertiliser

Production of fertilisers in Japan in April totalled 150,900 tons, an average of 8,000 tons over the previous month. Output of calcium cyanamide during April rose by 10,000 to 51,000 tons.—B.U.P.

Fluidisation for Oil Sands

The possibility of extracting oil from the Athabasca oil sands by the fluidised solids technique was described in a recent talk to the Edmonton branch of the Chemical Institute of Canada. In this process, the sand bed is agitated thoroughly by passing gas through it, and when hot the oil sand is fed into an extraction cylinder, and the oil distilled off. Pilot-plant experiments on this application of the process in Ottawa are at present being carried out.

'Whale Wool' Next

A process for the manufacture of synthetic wool from whale blubber is reported to have been developed by Dr. Yoshio Shita, the Japanese nuclear physicist, who claims that by its use nearly three-quarters of the wool at present imported from Australia, could be saved. Professor R. B. Finch, a Far Eastern consultant for the U.S. Mutual Security Agency, who recently returned to Boston, is alleged to have been favourably impressed by the Japanese claims.—B.U.P.

Sales May Treble

Chemical industry sales in the United States, now running at an annual rate of 7,000,000,000 dollars, may more than treble their present total within the next 25 years, Mr. Raymon H. Ewell, of the Stanford Research Institute at Leland Stanford University at Palo Alto, California, told members of the Chemical Market Research Association recently.

Potash Search in Canada

The Potash Company of America has joined in the search for commercial deposits of potash in Saskatchewan. Pre-prospecting permits on 175,000 acres of land south-east of Saskatoon have been granted, and it is intended to drill several potash core tests in an effort to locate commercial quantities of the ore.

Personal

K. A. SPENCER, B.Sc.Tech., A.M.I.Chem.E., Assoc.M.C.T., is setting up as consultant on corrosion-engineering practice with special emphasis on coating materials and application of cathodic protection. His addresses will be 5 Greencourt Road, Petts Wood, Kent, and 40 South Street, London, W.1.

Following the first meeting of the Board of Management held since its annual general meeting in April, the British Colour Council announces that DR. C. J. T. CRONSHAW, F.R.I.C., Imperial Chemical Industries, Ltd., and DR. C. M. WHITTAKER, F.T.I., were unanimously re-elected president and chairman respectively.

The new president and vice-president of the Pharmaceutical Society are ALDERMAN W. J. TRISTRAM, Liverpool, and MR. T. HESELTINE, Normanton. Both have been chairman of the National Pharmaceutical Union. MR. W. SPENCER HOWELLS, Richmond, was re-appointed treasurer for the sixth year in succession.

DR. WALTER GEORGE HISCOCK has been elected a director of the Consolidated Zinc Corporation. Dr. Hiscock is a director and general manager of Imperial Smelting Corporation and the National Smelting Company.

A number of personnel changes have been announced by Monsanto Canada, Limited. MR. E. D. MOFFAT, plant manager of the company's Montreal plant, was appointed production manager of the recently acquired subsidiary, Barringham Rubber & Plastics Co., Oakville, Ontario, from 1 June. MR. D. D. STOKES, sales manager of the Adhesives and Resins Division at Montreal for the past two years, assumes duties of plant manager of the Montreal plant. DR. FRANK J. LEGER was appointed Research Director, with headquarters at Montreal, and MR. H. F. DIXON, assistant manager of Western Operations, succeeds Mr. D. D. Stokes as sales manager of the Adhesives and Resins division. MR. D. A. LAYFIELD, of the Toronto plastics sales staff, is now sales manager of the Barringham Rubber & Plastics Co. MR. G. F. PARKER was transferred from Montreal to Oakville and will continue to be engaged in development work for the subsidiary and the parent company.

Obituary

The death occurred at Ascot on 21 June of COLONEL WALLACE CHARLES DEVEREUX, C.B.E., one of the most outstanding figures in the light metal industry.

After the 1914-18 war, during which he was superintendent of National Aircraft Factory No. 1, Colonel Devereux realised the forthcoming importance of forged aluminium alloys, and in 1927 he formed High Duty Alloys, Ltd., to carry out research and development leading to the commercial production of the new high strength alloys needed by the aircraft industry. The great value of the technical developments and facilities built up under his direction became apparent at the beginning of the last war when every R.A.F. aircraft used forged pistons.

In 1945, conscious of the great strides taken by the aluminium industry and the need for a more broadly based organisation, Colonel Devereux founded the Associated Light Metal Industries Group, spanning industry from raw material to finished product. During the past seven years this organisation has undertaken manufacture of some of the most outstanding applications in aluminium yet conceived, including the aluminium roof structure for the Dome of Discovery, the telescopic gangways for the ocean terminal, Southampton, and the world's first all-aluminium aircraft hangars at London Airport.

Holding that progress in light metal development rested principally on research, Colonel Devereux always employed in his works a high proportion of research workers.

After the war, he also broadened the base of his research activities by founding the Fulmer Research Institute at Stoke Poges. This institute was designed to meet the urgent needs of industry for laboratories which would carry out research on a sponsored basis for individual companies. Nothing on this scale had been attempted before in this country and this was, in many respects, one of his most enlightened actions.

Born in 1893 and educated at King Edward's Grammar School, Aston, Colonel Devereux was, besides his industrial activities, well known as an enthusiastic farmer.

British Chemical Prices

LONDON.—Business during the past week has been of a routine nature with prices mostly stable at recent levels. There has been a fairly active demand for shipment for export but the volume of new business for home account is somewhat restricted with buyers unwilling to enter into long-term commitments. There has been no special feature reported from any section of the market. Conditions in the coal tar products market are unchanged with supplies adequate to meet the demand.

MANCHESTER.—A fair weight of new business has been placed on the Manchester chemical market during the past week, though in the home-trade section there is a continued tendency among some buyers to restrict new commitments to shorter periods than has been their wont. Little or no improvement has been reported in the case of textile chemicals, and short-time working in the cotton and rayon industries has cut the demand noticeably for a wide range of products, including dyestuffs. Easiness has developed in one or two directions, but otherwise prices have been maintained. Fertilisers are now quiet, but a moderate volume of fresh business has been placed in the tar products.

GLASGOW.—There was very little movement last week in the general chemical market in Scotland, business being confined mainly to the essential every-day lines, and there does not appear to be any immediate prospect of any change.

The demand for products for export has been more brisk over the last three or four weeks and as far as can be ascertained a steady business is being done.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £110 ; 80% pure, 1 ton, £116 ; commercial glacial 1 ton, £130 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £166 per ton.

Acetone.—Small lots : 5 gal. drums, £145 per ton ; 10 gal. drums, £135 per ton. In 40/50 gal. drums less than 1 ton, £115 per ton ; 1 to 9 tons, £114 per ton ; 10 to 49 tons, to £113 per ton ; 50 tons and over, £112 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 4s. 7½d. per proof gallon ; 5000 gal. lots, d/d, 4s. 8½d. per proof gal.

Alcohol, Diacetone.—Small lots : 5 gal. drums, £204 per ton ; 10 gal. drums, £194 per ton. In 40/45 gal. drums : less than 1 ton, £174 per ton ; 1 to 9 tons, £173 per ton ; 10 to 50 tons, £172 per ton ; 50 to 100 tons, £171 per ton ; 100 tons and over, £170 per ton.

Allyl Alcohol.—Less than 40 gals., 3s. 10½d. per lb. ; 40 gal., 3s. 6½d. per lb. ; 2 to 5 40 gal. drums, 3s. 4½d. per lb. ; 1 ton and over, 3s. 2½d. per lb.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER : Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER : £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £47 per ton.

Ammonium Chloride. — Grey galvanising, £31 5s. per ton, in casks, ex wharf. Fine white 98%, £23 12s. 6d. to £26 5s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER : £6 2s. 6d. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £93 and £91 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots as to grade, etc., 2s. 3½d. to 3s. 1½d. per lb. Crimson, 3s. 4½d. to 4s. 5½d. per lb.

Arsenic.—Per ton, £59 10s. nominal, ex store.

Barium Carbonate.—Precip., d/d ; 2-ton lots, £35 5s. per ton, bag packing.

Barium Chloride.—£44 10s. 2 ton lots d/d bags.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £41 per ton d/d ; 2-ton lots, £41 5s. per ton d/d.

Bleaching Powder.—£21 per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid: Anhydrous, £59 10s. ; in 1-cwt. bags; commercial, granular, £39 10s. ; crystal, £42 ; powder, £43 ; extra fine powder, £44 ; B.P., granular, £48 10s. ; crystal, £51 ; powder, £52 ; extra fine powder £53.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid : Commercial, granular, £68 ; crystal, £76 ; powder, £73 10s. ; extra fine powder, £75 10s. ; B.P., granular, £81 ; crystal, £88 ; powder, £85 10s. ; extra fine powder, £87 10s.

Butyl Acetate BSS.—£209 per ton, in 10-ton lots.

Butyl Alcohol BSS.—£181 per ton, in 10-ton lots. 10 to 49 tons £163 per ton.

***sec.* - Butyl Alcohol.**—5 gal. drums £164 ; 40/45 gal drums : less than 1 ton £144 per ton ; 1 to 10 tons £143 per ton ; 100 tons and over £140 per ton.

***tert.* - Butyl Alcohol.**—5 gal. drums £195 10s. per ton ; 40/45 gal. drums : less than 1 ton £175 10s. per ton ; 1 to 5 tons £174 10s. per ton ; 5 to 10 tons, £173 10s. ; 10 tons and over £172 10s.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4-ton lots.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chromic Acid.—2s. 0½d. to 2s. 0¾d. per lb., less 2½%, d/d U.K.

Citric Acid.—1 cwt. lots, 218s. cwt. 5 cwt. lots, 213s. cwt.

Cobalt Oxide.— Black, delivered, 13s. per lb.

Copper Carbonate. — MANCHESTER : 2s. 8d. per lb.

Copper Sulphate.—£107 17s. 6d. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £11 12s. d/d.

Ethyl Acetate.—10 tons and upwards, d/d £174 per ton.

Formaldehyde.—£35 per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £82 5s. in 4-ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1,260 s.g. £14 19s. per cwt.
Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hydrochloric Acid.—Spot, 12s. to 16s. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £124 10s. per ton. 35% wt. £156 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 21s. 3d. per lb. in cwt. lots.

Iodoform.—25s. 4d. per lb. in cwt. lots.

Lactic Acid.—Pale tech., 44 per cent by weight £122 per ton ; dark tech., 44 per cent by weight £87 per ton ex works ; Usual container terms.

Lead Acetate.—White : £162 10s. per ton.

Lead Nitrate.—£119 per ton.

Lead, Red.—Basis prices per ton : Genuine dry red lead, £155 15s. ; orange lead. £167 15s. Ground in oil: red, £177; orange, £189.

Lead, White.—Basis prices : Dry English, in 5-cwt. casks, £166 15s. per ton. Ground in oil : English, under 2 tons, £186.

Lime Acetate.—Brown, ton lots, d/d, £30 to £34 per ton ; grey, 80-82%, ton lots, d/d, £34 to £39 per ton.

Litharge.—£155 15s. per ton.

Magnesite.—Calcined, in bags, ex works, £22 to £24.

Magnesium Carbonate.—Light, commercial, d/d, £87 15s. ; cwt. lots £97 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £221 ; cwt. lots £227 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—20s. 1d. per. lb. in 28 lb. lots ; smaller quantities dearer.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 7s. 10d. per gal. ; pyridinised 64° O.P. 100 gal., 7s. 11¼d. per gal.

Methyl Ethyl Ketone.—5 gal. drums, £179 per ton ; in 40-45 gal. drums, less than 1 ton, £159 per ton ; 50 to 100 tons, £156 per ton ; 100 tons and over, £155 per ton.

Methyl *iso*Butyl Ketone.—5 gal. drums, £209 per ton ; in 40-45 gal. drums, less than 1 ton, £189 per ton ; 50 to 100 tons, £186 per ton ; 100 tons and over, £185 per ton.

Nickel Sulphate.—D/d. buyers U.K. £140 10s. per ton.

Nitric Acid.—£35 to £40 per ton, ex works.

Oxalic Acid.—About £181 per ton, packed in 5-cwt. lots, packed in free 5-cwt. casks.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £71 10s. per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 3½d. per lb.

Potash, Caustic.—Solid, £98 10s. per ton for 1-ton lots ; Liquid, £37 15s.

Potassium Bichromate.—Crystals and granular, 11½d. per lb. ; ground, 1s. 0½d. per lb., standard quantities.

Potassium Carbonate.—Calcined, 98/100%, £116 per ton for 1-ton lots, ex store.

Potassium Chloride.—Industrial, 96%, 6-ton lots, £20 to £22 per ton.

Potassium Iodide.—B.P., 18s. 7d. per lb. in 28 lb. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots ; for 3 cwt. and upwards, 1s. 6½d. per lb. ; technical, £8 3s. per cwt. ; for 5 cwt. lots.

***iso*Propyl Alcohol.**—Small lots : 5 gal. drums, £156 per ton ; 10 gal. drums, £146 per ton ; in 40-45 gal. drums : less than 1 ton, £126 per ton ; 1 to 9 tons, £125 per ton ; 10 to 50 tons, £124 per ton ; 50 to 100 tons, £123 per ton ; 100 tons and over, £122 per ton.

Salammoniac.—Dog-tooth crystals, £72 10s. per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid. — MANCHESTER : Technical 2s. 2d. to 2s. 5d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic.—Solid 76/77% ; spot, £23 5s. per ton d/d. (4 ton lots).

Sodium Acetate.—£85 to £91 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £12 7s. 6d. per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 9¾d. per lb. ; anhydrous, 11¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£87 to £95 per ton.

Sodium Cyanide.—100% basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton ; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 20s. 1d. per lb. in 28 lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £123 ton.

Sodium Metasilicate.—£22 15s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98%, 6-ton lots, d/d station, £30 15s. per ton.

Sodium Nitrite.—£31 for 1 ton lots.

Sodium Percarbonate.—12½% available oxygen, £8 8s. 4½d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £37 10s., anhydrous, £78 10s. ; tri-sodium, crystalline, £39 10s., anhydrous, £75 10s.

Sodium Prussiate.—10d. to 10½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber's Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £6 10s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot. £30 per ton, d/d, in drums ; broken, £30 15s. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £59 per ton ; pea crystals, £37 12s. 6d. per ton d/d station in kegs ; commercial, £23 7s. 6d. per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £22 16s. 6d. to £25 6s. according to fineness.

Tartaric Acid.—Per cwt. : 10 cwt. or more, £13.

Titanium Oxide.—Comm., ton lots, d/d (56-lb./112 lb. bags), £125 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d ; white seal, £159 10s. ; green seal, £158 10s. ; red seal, £157.

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 3½d. to 3s. 1½d. per lb. Crimson, 3s. 4½d. to 4s. 5½d. per lb.

Carbon Bisulphide.—£65 5s. per ton, according to quality.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£74 10s. per ton.

India-rubber Substitutes.—White, 1s. 9d. to 2s. 2d. per lb. ; dark, 1s. 7½d. to 2s. 0½d. per lb.

Lithopone.—30%, £65 per ton.

Minera Black.—£7 10s. to £10 per ton.

Mineral Rubber, 'Rupron.'—£20 per ton.

Sulphur Chloride.—British 48s. 6d. per cwt.; Imported £120 per ton.

Vegetable Lamp Black.—£49 per ton

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton ots, d/d farmer's nearest station, £16 18s.

Compound Fertilisers.—Per ton in 6 ton lots, d/d farmer's nearest station, I.C.I. Special No. 1 £27 9s.

'Nitro-Chalk.'—£12 9s. 6d. per ton in 6-ton lots d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots d/d nearest station, £30 15s. per ton.

Coal-Tar Products

Benzole.—Per gal, ex works : 90's, 3s. 8½d. ; pure, 3s. 11½d. ; nitration grade, 4s. 2½d.

Carbolic Acid.—Crystals, 1s. 6d. to 1s. 8d. per lb. Crude, 60's, 8s. MANCHESTER : Crystals, 1s. 6d. to 1s. 8d. per lb., d/d crude, 8s. naked, at works.

Creosote.—Home trade, 10d. to 1s. 2d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 11½d. to 1s. 4d. per gal.

Cresylic Acid.—Pale 99%, 5s. 8d. per gal. ; 99.5/100%, 5s. 10d. American, duty free, for export, 5s. to 5s. 8d. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 2½d. per gal. for 1000-gal. lots ; heavy, 90/190°, 3s. 8d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, ton lots, in sellers' bags, £18 16s. 3d. to £34 per ton according to m.p. ; hot-pressed, £50 to £60 per ton, in bulk ex works ; purified crystals, £68 10s. to £79 3s. 4d. per ton.

Pitch.—Medium, soft, home trade, 130s. per ton f.o.r. suppliers' works ; export trade, 200s. per ton f.o.b. suppliers' port. MANCHESTER : £6 10s. f.o.r.

Pyridine.—90/160°, 42s. 6d. per gal. MANCHESTER : 40s. to 42s. 6d. per gal.

Toluol.—Pure, 4s. 7½d. per gal. MANCHESTER : Pure, 4s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 1½d. per gal., according to grade, d/d.

Intermediate and Dyes
(Prices Nominal)

***m*-Cresol 98/100%.**—3s. 9d. per lb. d/d.

***o*-Creso 30/31° C.**—1s. 4d. per lb. d/d.

***p*-Cresol 34/35° C.**—3s. 9d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb. ; 66/68° C., 1s.

***p*-Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb. ; P.G. 1s. 0½d. per lb.

***o*-Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—2s. 2d. per lb., in casks.

***m*-Xylidine Acetate.**—4s. 5d. per lb., 100%.

Chemical & Allied Stocks & Shares

NEARLY all sections of stock markets have suffered a further decline of values in June, largely because they reflected the fresh set-back in British Funds. Main factor affecting sentiment has been the continued talk of a further increase in the bank rate, though this is not generally expected unless there were a sharp reaction in the value of the £ in New York. Leading industrial shares have been affected by the indications that profits are running well below the record levels which many companies reported a year ago. In particular, Courtaulds' warning that, if the world set-back in the rayon trade continues, a dividend may not be earned this year emphasised the current trends; but the latter are not regarded in many quarters as the beginning of a serious general slump.

Mr. John Rogers Optimistic

Mr. John Rogers, chairman of Imperial Chemical Industries said at the recent annual meeting that he does not interpret current trends in this gloomy light. So far in 1952, he said, Imperial Chemical has not been seriously affected, and turnover had been satisfactory despite the revival of German and Japanese competition. Imperial Chemical ordinary units have been firmer at 42s. 1½d.

At the annual meeting the chairman also mentioned that when conditions are suitable, another application will be made to the Capital Issues Committee for permission to distribute a share bonus to bring issued capital more into line with resources actually employed in the business. The application made in April, 1951, was not granted.

Laporte Firmer

Laporte 5s. shares have been firmer around 9s. on the increased profits and higher dividend; more capital, the chairman has announced, will be required in the autumn to repay bank loans incurred in the company's expansion plant. Albright & Wilson 5s. shares changed hands around 14s., F. W. Berk 2s. shares around 5s. 7½d. and J. & J. White were 11s. 6d.

In other directions, Greeff Chemical 5s. shares were 13s. 9d., Hickson & Welch 9s. 9d., Monsanto Chemicals 5s. shares 22s. 6d. and Eaglescliffe 5s. shares 14s. 9d., while Brotherton 10s. shares held firm at 21s. 9d. and W. J. Bush at 50s. Boake Roberts 5s. shares were 13s., Sanitas Trust 10s. shares 15s., and Bowman Chemical 5s. 9d., but Amber Chemical eased to 2s. on the dividend decision. Elsewhere, Fisons were 26s. 3d., and British Chemical & Biological's 4 per cent preference 14s. 6d., while Pest Control 5s. ordinary shares have been dealt in around 4s. 3d. L. B. Holliday 4½ per cent preference were 15s. 9d.

British Glues & Chemicals 4s. shares were 10s., Borax Consolidated 32s. 9d., but shares of companies connected with plastics lost ground with British Xylonite at 23s. 6d. and De La Rue 10s. 3d. Coalite & Chemical 2s. shares kept around 1s. 10½d. British Industrial Plastics 2s. shares were 4s. 10½d. and William Blythe 3s. shares quoted at 9s. 9d.

Unilever at 42s. responded to the statements at the annual meeting. The 4s. shares of the Distillers Co. were 16s. 9d. and United Molasses 29s. Associated Cement were 90s. 6d. but paint shares moved generally lower on balance with Pinchin Johnson at 33s. 3d. though Lewis Berger 4s. units at 9s. were relatively steady, awaiting the results, due shortly. United Glass Bottle have been dealt in around 67s. 6d. and Triplex Glass 10s. shares around 20s. 3d. Oils have been active with Anglo-Iranian at close on £5½ and Shell up to 95s. while Burmah Oil were 61s. 3d. and Trinidad Leaseholds 26s. 9d., but Ultramar have come back to 27s. 7½d. since publication of the results.

Portuguese Ammonium Sulphate Plant

A new ammonia plant at Estarrapa, Portugal, was officially inaugurated recently by the President of the Republic. Production of 25,000 tons a year of sulphate of ammonia, based on electrolytic hydrogen, is estimated in the first stage, with output of a further 30,000 to 40,000 tons envisaged at a later date. Portugal's annual consumption of sulphate of ammonia is at present calculated to be 100,000 tons, but it is expected that it will soon reach 150,000 tons.

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The well-known cylindrical 7-ampoule rigid carton has disappeared. B.D.H. Concentrated Volumetric Solutions are now issued in a new package of six ampoules. This gives even more security than the original container, costs less, and is more compact. While the ampoules are unchanged, increasing production and the more economical packing enable them to be supplied at much lower prices. The new range includes a carton of solutions for the precise determination of water hardness by the Schwarzenbach method. Please ask for a copy of the price list.

The accuracy of solutions prepared as directed from B.D.H. Concentrated Volumetric Solutions is within the factor limits of 0.999 and 1.001.

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Zinc in Aluminium

A METHOD for the polarographic determination of zinc in aluminium and its alloys has now been published by the British Standards Institution as an alternative to the mercuric thiocyanate method already published (part 3).

As with polarographic methods in general, part 4, of B.S.1728: 1952, of the British Standard for Methods of Aluminium and Aluminium Alloys, is particularly useful for alloys having a low zinc content and, over a range of 0.02 to 3 per cent zinc, gives results having close agreement with the mercuric thiocyanate method.

The method specifies the reagents used, recommended methods of sampling and test procedure. An indication of the reproducibility expected is given and is derived from experiments carried out by a number of independent analysts.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street, London, S.W.1. (Price 2s.).

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Company Meeting

IMPERIAL CHEMICAL INDUSTRIES LIMITED

Year of Outstanding Progress

THE 25th Annual General Meeting of Imperial Chemical Industries, Ltd., was held on June 19th, at Wigmore Hall, 36, Wigmore Street, London, W.1.

Mr. J. Rogers, O.B.E., LL.D., the chairman, presided, and in the course of his speech, said :—

" As the report shows, the company has again broken records, both in turnover and in profits. It is true that some part of the increase in turnover is due to rising prices, but the physical volume of turnover has also increased to record levels.

" It is the considered opinion of the directors that, after full provision has been made for the proper maintenance of the productive assets of the company, stockholders should be given, by way of increased dividends, some part of the increased profits due to the progressive expansion of the company. The total Ordinary dividend for 1951, 13 per cent, before taxation, is still smaller in purchasing power than the dividend of 8 per cent paid for a number of years before and during the war.

" The company's record for 1951 is one of outstanding progress. That progress continues, and the directors have before them no shortage of important and profitable schemes of expansion and development in which the company's resources can be employed.

" Exports are as important, or almost as important, as rearmament. The company's direct exports are now running at well over a £1,000,000 a week. In addition to the company's direct exports, it has to be remembered that a substantial proportion of our products goes to other industries which are producing for export. For this reason it is in the interests of the country, as well as of the company, that our capital programme should be pressed forward with no more delay than is absolutely necessary during the present crisis conditions.

" So far as our future trading prospects are concerned, I should be unwise if I attempted any prophecy to-day. 1952 has brought new problems to some industries which a year or two ago were having difficulty in finding enough materials and labour to cope with an excessive demand, but which to-day are unable to find adequate markets either at home or overseas for their output. The setback in the textile industries, for example, is not a problem peculiar to this country, but is world-wide, and this setback inevitably affects the demand for dyestuffs. For other industries there has been similar change from anxiety about raw materials to anxiety about markets. Nevertheless it is difficult to interpret these signs as foreshadowing a general depression. So far in 1952 we have not been seriously affected by these conditions and our turnover has been satisfactory, notwithstanding the resurgence of German and Japanese competition.

E.P.L.—A HARMFUL TAX

" I am confident that we shall continue to expand our business in spite of the obstacles to expansion placed in our way, and in the way of other progressive companies, in the form of penal taxation, which seems almost to have been designed to encourage stagnation and to prevent progress. I refer, in particular, to the new excess profits levy. Whatever the yield of this tax and whatever its purpose in terms of party politics, this tax, even in its modified form, will do much more harm than good to the country, and it is bound to hit hardest those progressive companies whose activities are most likely to assist the country to get out of its present economic troubles, particularly those engaged in the export trade."

The report and accounts were adopted.

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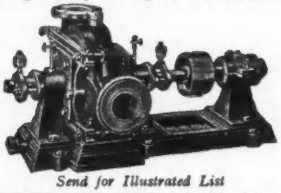

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CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagemen of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive, or a woman aged* 18-59 *inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952.

HER MAJESTY'S COLONIAL SERVICE

A vacancy exists for a **POLLUTION INSPECTOR** (27106/61/52) in Uganda. The post is on contract terms with salary, according to qualifications and experience, in the scale £585 to £1,320 per annum. A gratuity of 15 per cent of 9/10ths of basic salary is payable upon satisfactory completion of 30-36 months contract, and in addition a temporary cost of living allowance, at present 25 per cent of basic salary, subject to maximum of £250 per annum. Outfit allowance of £30. Air passages covering officer and family; quarters a rental not exceeding 10 per cent of basic salary; income tax at low local rates; medical attendance free for officer and family (if basic salary is below £1,140 per annum). Candidates should possess a degree in Chemistry and preference will be given to those who have had experience in the treatment of polluting liquids or in the control of pollution of surface waters.

Duties include advising under the control of the Labour Commissioner, on the dangers of industrial and sewerage pollution of the atmosphere and waters of the protectorate and measures to be taken to avert these dangers. Officer may also be required to assist Chief Factories Inspector in chemical problems arising in factories, etc., not always connected with pollution dangers.

Intending candidates should apply in writing, to **THE DIRECTOR OF RECRUITMENT (COLONIAL SERVICE), COLONIAL OFFICE, SANCTUARY BUILDINGS, GREAT SMITH STREET, S.W.1,** giving brief details of their age, qualifications and experience. They should mention this paper and quote the reference number (27106/61/52).

ANALYTICAL CHEMISTS Senior and Junior Analysts, with experience of Inorganic Analysis, required for the Nelson Research Laboratories of the English Electric Co., Ltd., at Stafford, for work of an interesting and varied nature. Please write, giving full details of age, qualifications and experience, and quoting Reference 997, to **CENTRAL PERSONNEL SERVICES, 24-30, GILLINGHAM STREET, LONDON, S.W.1.**

CHEMICAL ENGINEERS for Process Design and/or Development Work are required by **THE BAHREIN PETROLEUM COMPANY, LTD.** Degree or Chartered applicants only considered, who must have had a minimum of three years' experience in this type of work. Salary in accordance with qualifications and experience, on successive two-year agreements with paid local and home leaves. Board, air-conditioned living accommodation and medical attention are provided in addition to salary, with low living costs, pension scheme and kit allowance. Age limits, 25 to 40 years. Apply, with full particulars of qualifications, experience, etc., to **BOX No. 5933, c/o CHARLES BARKER & SONS, LTD., 31, BUDGE ROW, CANNON STREET, LONDON, E.C.4.**

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"PULMAC" **GRINDER** by Int'l. Pulverizers. Speed, 4,000 r.p.m. Motorised 400/3/50. Vertical concentric beater type mill with 12½ in. diam. chamber and two sets fixed beaters. Vibrator feed to mill centre.

Edgar Allen "Stag" **COMBINATION TUBE MILL,** 28 ft. × 5 ft. diam., divided by cast steel diaphragms into three compartments, one 4 ft. 6 in. long with stepped steel cast liners, one 5 ft. 9 in. long, and one 16 ft. long, both with C.I. bar liners. Mill rotates at 27.7 r.p.m. in 20 in. diam. × 16 in. swivelling trunnion bearings. Driven through David Brown reduction gear. Approx. 12 tons 2½ in.-1 in. balls available. Output when grinding coal, 4½ tons per hour, 85 per cent through 170 B.S.P. seive.

"Briton" **GRINDER,** type B.11 by Christy Norris. 24 swinging hammers on rotor shaft, 2½ in. diam. Feed aperture, 12 in. × 7 in. Motorised 400/3/50.

C.I. totally enclosed Unjacketed **MIXER,** 6 ft. int. diam. × 6 ft. deep on straight, 3 ft. hemispherical bottom, domed cover. Vertical glanded 4 in. diam. agitator shaft fitted two shrouded propeller type agitators. Fast and loose pulley drive.

Unused 30-gal. Stoneware **MIXER,** by Hathernware, totally enclosed and acid- and heat-resisting. Grouted in C.I. casing on a four legs. 1 in. centre bottom outlet. Fitted two Vitreosil 4kW. immersion heaters. Motorised 400/3/50.

S.J. **VACUUM MIXER,** by Bartle. Int. dimensions, 3 ft. 6 in. × 2 ft. 6 in. × 3 ft. 3 in. Perf. paddle-type agitators fitted to 2½ in. diam. shaft. 1 in. bottom outlets at each end. Close fitting lid, bolted. Fast and loose pulley drive.

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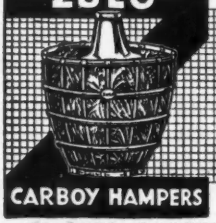
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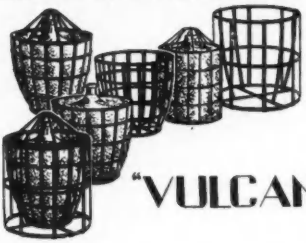

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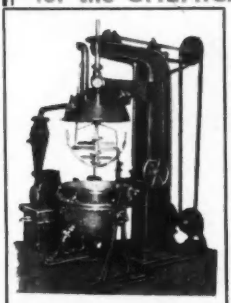

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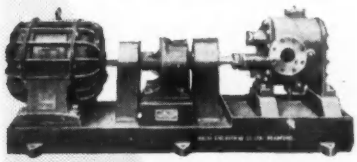

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